RAILROAD GAZETTE

SATURDAY, MAY 27, 1871.

BREVOORT'S THROTTLE-VALVE LEVER.

This improvement, which is represented by the engraving herewith, is intended to facilitate the movement of locomotives. With the present arrangement of throttle-valve and lever, it is almost impossible to open the valve gradually and avoid starting the engine and moving the train with more or less violence. This, besides being very unpleasant to passengers, is very damaging to cars. With the throttle-lever shown in the cut the valve can be opened slowly by means of the screw, or rapidly by the use of the lever. In starting the train, or in regulating the supply of steam to the engine, the screw is the most convenient; whereas in stopping, or "shutting off" the steam, the lever will be the quickest and most prompt.

The simplicity of the arrangement is not its least merit. The lever has an ordinary spring-latch, which gears into the threads of the screw. By turning the hand-wheel the lever is of course moved by the thread on the screw. The latter is attached to the boiler by a ball-and-socket joint, so that it will adjust itself to the arc described by the throttle lever.

This device has been applied to a number of engines built at the Grant Locomotive Works, and is in use in the Delaware, Lackawanna & Western, Morris & Essex Central of New Jersey, Hudson River, and New York & New Haven railroads. It was designed and patented by Henry L. Brevoort, Mechanical Engineer, No. 128 Broadway (Room 13), New York, who can be addressed there for further information.

The Canada Southern Railroad.

The President of this company, Mr. William A. Thomson, writing from Queenston, Ontario, under date of May 18, says in a letter to the Toronto *Globe:*

I have a few words to say to those who are the friends of this line, whose minds have been disturbed by the literature of Hamilton, which has been copiously supplied to the public for a good many weeks past in the shape of telegrams, and again in long "Vindex" articles, but all having the same paternity, although sometimes made to appear as from an American source in Detroit, at another time as from Chicago; and from these sources advertised in New York and London, and republished all round in minor places—all to show that the outside public—particularly the American—was "down" on the Canada Southern; that the road was not needed; that it could have no connections east or west; that it would not pay; that it could not sell its bonds; that it was no better in its grades and alignments than the Great Western Loop Line; that an 8,500 feet long and 90 feet deep tunnel was to be added to the already overburdened traffic cost on the Great Western; that an alliance, offensive and defensive, was made by the Great Western and Michigan Central to wage war on all other lines in Canada; that the Canada Southern was trying to sell bonds and could not; and, finally, very gravely stated in an English railway paper that it was all up with the Canada Southern. Surely, this is enough of a dose! Pity there had not been a little more Josephly discretion in hiding the paternity; and particularly fortunate for the literary bureau of monopoly in Hamilton that the Canada Southern has its whole attention devoted to construction, and is rather indifferent to public opinion outside of its friends and well-wishers, therefore leaves the newspaper and Dorcas Sewing Society avenues entirely to its enemies.

I desire simply in this article to utter a fact or two for the satisfaction of the friends of the Canada Southern. I therefore state positively that the line of the Canada Southern is under "full blast" of construction; that we expect to have all the grading, bridging, fencing, etc., completed, and also fifty miles of track laid, this year; that we have no bonds in the market, nor have we had, nor do we intend to have for many months to come; that we have borrowed no money, nor do we intend to do so, except by the usual sale of bonds at our future pleasure; and that we have plenty of cash means on hand to do all the work stated above, and to meet every engagement on the instant.

The Canada Southern Company is satisfied with the undertaking in hand, and the efforts of other companies to mar its progress will continue as futile as they have heretofore been.

The Stock Exchange will in good time settle relative values between this and other lines.

—The directors and officers of the Eastern, of Massachusetts, and the Portland, Saco & Portsmouth railroads dined last week at Portland in honor of the contract signed the week before, for a lease, we believe, of the latter road to the former company. This week an excursion by the directors of these companies, together with the Maine Central and the European and North American directors, was had in a Pullman train from Boston to Bangor, over the Portland and Kennebec Division of the Maine Central road, and from Bangor to Mattawamkeag, the eastern terminus of the European & North American road.

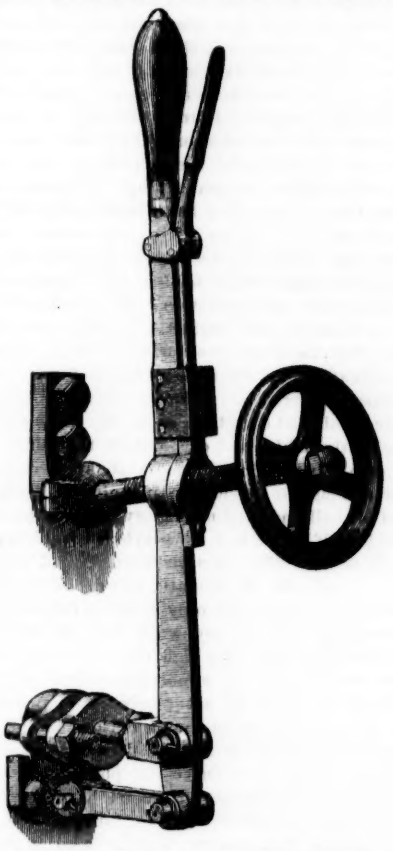
Contributions.

RAIL SUPPLY FROM ENGLAND.

III.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In two previous articles on this subject we have offered some remarks to the rail-consuming interest of this country, as to the manner of procuring good rails from the producing districts of England, and have also expatiated at some length on the technical bearing, as to manufacture, quality, etc., of the old established article of iron rails, which, taking them all in all, and with a proper care in the matter of selection, appear to be still, in the majority of instances, the best and cheapest road-making material for steam traffic on land. Nevertheless, the age in which we live is constantly exerting itself in improvements, and this maxim holds good to an eminent degree in all matters of engineering. Moreover, the traffic which it was originally intended to accommodate by the construction of iron roads has, by reason of this accommodation, in many places grown to such an extent that it has become a question whether these iron roads are adequate any



Brevoort's Patent Throttle-Valve Lever.

longer to meet the requirements of the case. Iron, like every other material, will wear out sooner or later, in proportion to the strain that is put upon it; and where it has, by increase of traffic, been found to be wanting in endurance, the idea has naturally suggested itself of replacing it with some harder or more enduring substance. As a matter of course, the suggestion immediately reverted to steel, and was not long in being put to practical test; but the results were not as easily determined as might have been at first expected, and the reason why it still requires a great deal of careful consideration may be stated as three-fold, namely: in the first instance, a more delicate chemical composition; in the second instance, the want of a more extended practical experience of its application; and in the third instance, general commercial considerations as to cost, durability, etc. Now these are by no means new propositions, but perfectly well known to engineers and other practical men who occupy themselves with railway matters, and therefore the only aim of this paper must be to show in how far our knowledge has, at the present day, been extended in regard to the employment of steel for railway purposes, and especially for rails. This purpose, however, we feel confident, will justify us in counting upon the consideration to which we think the subject is entitled.

Steel has been employed in two ways to produce an improved rail, either for the top-slab only, which description is known as steel-headed rails, or for the manufacture of rails made entirely of steel. In the former description, the difficulty is to fix the steel to the iron, whether it be done mechanically or by welding. We think that, as far as present experince goes, the economical advantage has been a success, but the question as to the manner in which they may fail when worn out, and in how far they will give rise to accidents, remains still to be solved by actual experience. They will probably never be made for export from England, where they can scarcely compete with solid steel rails; but in colonies and countries situated far away from the rail-making districts, it would pay to re-roll old iron rails with steel heads rather than to pay freights for the old rails to and from the original place of manufacture.

Solid steel rails are now-a-days well known as a suitable substitute for iron rails, where these latter do not give sufficient resistance to the wear. They appear to have only one drawback, which is that they will break if the steel is the least too hard. In other respects experience has shown that their endurance under ordinary wear is about twelve times as great as that of iron rails, but as to safety they are more doubtful, and while manufactured should be daily tested for concussion by means of the falling ball and be subjected in all ways to quite as close an inspection as iron rails if they are to be depended upon. The results experienced during the late severe winters in countries with rigorous climates show these precautions to be highly essential.

As regards the manufacture, steel rails should not be notched, and the holes for the bolts should not be punched, but drilled. Unfortunately the raw material most suitable for the Bessemer process is, as far as known at present, very limited, which is proved by the fact that during the last two years steel rails have risen in price nearly two pounds per ton, although at the same time the royalty paid by the makers has been reduced by one pound per ton. This shows how little the supply has been able to keep up with the demand, and we should not be astonished to see the price of steel rails advance still more. Nevertheless, we think it a matter of necessity to point out to the makers of iron rails the paramount importance of their improving their manufacture, so as to regain and maintain their old reputation; for it should be borne in mind that the superiority of steel rails is chiefly to be found in the homogeneity of the substance and not so much in the greater hardness. If iron rails could be perfectly welded there is little doubt they would be practically worth as much as steel rails, and we therefore think that makers of iron rails would have a great interest in directing their skill and their efforts that way. Surely an additional expense of, say, ten shillings a ton would bring them ample compensation in producing an extra rail at a much more enhanced market price.

In the foregoing remarks we have dwelt at some length upon what we think the rail-makers ought to do and consider. Let us now take a glance at the position and interests of the rail-consumers. We have heard long and loud complaints of the rails supplied to the different lines in America, and our remarks on their causes, as far as we have been able by careful investigation to ascertain them, have by no means exonerated the railmakers. Yet it may be asked, not without reason, if everything laid to their charge is quite consistent with fact? If the deterioration of permanent way, so patent in many instances, may not have been caused by defective maintenance, as regards ballasting and drainage, by the use of cast-iron wheels, very hard and seldom, if ever, perfectly spherical, which naturally try the rails a great deal more than wrought iron tires, and we fancy that in these circumstances may be found a not immaterial cause why rails exhibit an earlier failure in America than in Europe.

Besides this, the rail-consumers in formulating their complaints, ought to state the speed and tonnage of traffic passing over their lines before any crushing has taken place. A few rails may fail through bad welding very early, but the average life should be taken and compared to see how the result tallies with that obtained as an average for similar quality of rails on other lines.

In a paper read before the Institution of Civil Engineers in London, which will be found printed in the transactions of the society, we find the following observations as to the wearing resistance of iron and steel rails, which we take the liberty of transcribing here as bearing on the economical part of the question which we wish to elucidate.

"The life or wear of iron rails is measured by the weight passed over them multiplied by the speed, and to find the life in years of 'extra' iron rails, the rule is, according to experiments made on several English as well as foreign railways, as follows: Multiply the annual weight with the speed in miles per hour, and divide this product into 220 millions (a fixed total, representing the weight at one mile per hour which a good rail ought to stand); the quotient shows the num-

ber of years good iron rails ought to last under ordinary circumstances. With light traffic (averaging, say, ten trains a day passing over the rails), it may be expected to obtain from sixteen to eighteen years' life out of them. On English railways the average life of iron rails, according to the traffic, is ten years, but on some railways in and around London, it does not amount to two years. On all such lines steel rails have now been substituted."

The question then arises: Where is the line to be drawn between the more profitable employment of iron rails or of steel rails? Taking the case of a certain European line, which in regard to climate and traffic offers a great similarity to many American railroads, it carries about ten trains a day, running at an average speed of eighteen miles an hour; the trains consisting of engine, 25 tons; tender, 15 tons; 15 carriages, each 10 tons; gross total, 190 tons. The rails, 62 lbs. per yard, extend over 1,000 miles in single line, and the road has been open for traffic ten years. Judging from the present state of preservation of the rails, they may be expected to average a duration of eighteen years, which pretty closely accords with the rule of annual speed—tons divided into 220,000,000 of tons—thus formulated: Weight of train, 190 tons × 10 trains per day = 1,900 tons × 365 days = 693,500 tons of load passing over the rails in the year at eighteen miles speed per hour = 12,483,000 speed tons divided into 220,000,000 = 17⅔ years' life of rails.

Assuming the traffic on any particular line to be equal to this, or even a little heavier, and that iron rails of a superior quality are used, such as can be obtained from the best works in Wales at an average price of £7 a ton, it will only be reasonable to estimate these rails to give an average life of fifteen years, although some small percentage may fail earlier. It may also be assumed, from practical experience, that steel rails, which can be bought for £11 10s. per ton, will last six times as long, and it thus becomes a question of annuity calculation to ascertain which of the two will be cheapest to use. The calculation shows the following results:

Superior Iron Rails.

90 tons at £7 per ton, with freight, say 30s. per ton, £8 10s. per ton	£765
Cost of laying down at £1 per ton	90
	£855
Which sum for 15 years at 5 per cent. compound interest is equal to	£1,777

The difference between this sum and the value of the old rails, say 90 tons at £5 per ton, is £1,327. Now the annuity required to recoup this sum in 15 years, or the amount of money which put out annually at 5 per cent. compound interest would in 15 years' time accumulate £1,327, is £60, which sum thus expresses the annual cost per mile of iron rails. (See Minutes of Civil Engineers' 1868–1869, page 328.)

Bessemer Steel Rails.

90 tons at £11 10s. per ton, with freight at 30s. per ton	£1,170
Cost of laying down at £1 per ton	90
Total	£1,260
Which sum at the end of 90 years (as steel rails are assumed to last six times as long as iron rails) will at 5 per cent. compound interest become	£101,720

The difference between this sum and the value of the old steel rails, 90 tons at £8 per ton, or £720, is £101,000, and the annuity required to recoup this sum in 90 years at 5 per cent. compound interest is £63 15s., which sum thus expresses the annual cost of rails per mile when using steel.

Assuming the traffic to be so much heavier that the life of superior iron rails could not be computed at more than 10 years, the annual cost per mile, as between such rails and steel rails, would compare differently as shown hereunder:

Superior Iron Rails.

90 tons at £7 per ton with freight 30s. and laying down £1, £9 10s. per ton	£855
Which sum at 5 per cent. compound interest for 10 years becomes	1,392
And after deducting value of old rails, 90 tons at £5	450
	£942

To recoup which sum in 10 years an annual amount is required to be put out at 5 per cent. compound interest of £73, which thus represents, in this case, the yearly cost per mile of iron rails.

Bessemer Steel Rails.

90 tons at £11 10s., freight 30s., laying down 20s. = £14	£1,260
Which sum at 5 per cent. compound interest for 60 years (as steel is assumed to last six times as long as iron) becomes	£23,536
And after deducting value of the old rails, 90 tons at £8	720
	£22,816

To recoup which sum in 60 years an annual amount is required to be put out at 5 per cent. compound interest of £63, which thus represents, in this instance, the yearly cost of rails per mile by using steel.*

* These calculations are subject to corrections by the additional charge of duty on iron and steel, which fluctuates according to legislation, and therefore has not been here taken into account.

We think these calculations as to which is the most economical class of rail to use, according to the amount of traffic on the line, are of great importance, and that complaints as to the quality of rails supplied might not unfrequently be met by the makers referring to such recognized standards of what iron rails can reasonably be expected to stand, the alternative being to use the more expensive article where the wearing strain can be shown to demand it.

Rapid Railroad Building in the United States—Some of the Reasons Therefor and the Consequences Thereof—A Word to Inexperienced Directors.

BY WM. S. HUNTINGTON.

Probably there are more miles of railroad now in course of construction than there has been at any time since the commencement of railroad building in this country. There has never been a time when so large a share of our population were interested in building railroads as at the present. There is hardly a village in the country that does not boast of from one to three or more railroad directors, and, as a matter of course, these men are expected to control the construction and management of the roads in which they are interested. It is usually the case that these directors are men who have had no experience in the building or operating of railroads, but are elected to that office by reason of their being large stockholders or prominent in the community. It is considered proper for men having large sums invested in any enterprise to have a controlling power corresponding to the amount of their investments. It is taken for granted by the smaller stockholders, that as these men have been successful in the management of their own affairs, and are thus enabled to subscribe largely to the capital stock of the road, they will be equally successful in the management of its construction and operation. To a certain extent these conclusions are correct. A business capacity acquired by practice in the successful management of one's own affairs fits one in some degree for the control of railroad matters; but it is seldom that these inexperienced railroad directors adopt the same policy in managing the affairs of a corporation that they do in their own. If a business man is about to engage in manufacturing, he leaves the planning and construction of his buildings and machinery to men experienced in that line, if he has had no previous experience himself. It is generally supposed that railroad construction is under the immediate charge of competent engineers, but this is true only so far as relates to location, bridging, etc., or any work that affords opportunity for the display of a high degree of engineering skill. Other matters of minor importance, or at least considered as such, do not receive proper attention from engineers in charge, for the reason that the supervision of common-place matters does not raise one's reputation so fast as the successful planning and building of a long-span bridge. Here we have a cause for a great deal of shammy work in railroad building—want of proper attention to small matters, as they are termed, but which are really of great importance.

Another cause of the careless manner in which many of our roads are built may be found in the fact that we get in too great a hurry. A route is surveyed and located, and the people along the line are greatly excited at the prospect of soon being brought into speedy communication with "all the world and the rest of mankind." The excitement lasts until work is commenced, when it suddenly cools down. It is truly remarkable to witness the air of coolness and unconcern with which they receive the intelligence that five, ten or twenty miles or more are ready for the iron. But when it is known that track-laying has commenced, and and that a locomotive is running on the road, their excitement knows no bounds. Crowds of industrious citizens who have not left their work for years, except on some important occasion, flock daily around the end of the track that they may see the iron horse and watch the progress of operations. They watch every motion with intense interest, and do not fail to ask the "boss," a dozen times, "When will the engine run up to our place?" And when each man, woman and child (for women and children are there) has been told that number of times that they may expect it there by a certain day, they promise "the boys a big time" if they get there a day or two sooner. And it is frequently hinted to the "boss" that if he will reach the village with the "ingine" by a certain time, a hundred, five hundred, or perhaps a thousand dollars in greenbacks are ready for him. This is a matter worthy of consideration, and the "boss" and all hands share in the general excitement. The main thing now is to get along as fast as possible, regardless of the manner in which the work is done. Ties are thrown down in a hap-hazard sort of way; the iron ditto; the joints are spiked, and one or two center ties being spiked, the locomotive, with a long train of cars, heavily loaded with iron and other material, is allowed to pass over the track. In many places a rail will only have a bearing on three or four ties, the other ties being three or four inches below the rail. Of course the rails are incapable of sustaining the weight of the train, and they are frightfully bent surface-wise, and are likely to remain so as long as they remain in the track. But after a season of hurry and scramble, the station is reached; then, after a feast and some speech-making, a rush is made for the next station. It sometimes happens that ties run short. The plan, in such cases, is to go back and pick up all the condemned ties that can be found on the line. Small, crooked, unsound ones, that were considered worthless by the inspector, are now picked up and used. Perhaps the track-layers are crowding the graders, and they leave embankments before they are brought up to grade or of the proper width. Deep cuttings are sometimes left before being down to grade, and the track is laid and afterwards lowered to grade. Streams are crossed on temporary structures, rather than wait a short time for the completion of a substantial bridge.

There are instances where some of the above-mentioned evils are unavoidable. It sometimes happens that the material for building a permanent bridge cannot be had on the spot until cars are running up to the site. At other times material for embankments must be moved a considerable distance, and in such cases it will be advisable to widen the embankment and bring it up to grade with the construction train. Trestle-work put up for temporary use is frequently broken down, and lives and property enough destroyed to have paid the company for waiting for the completion of a safe structure. Culverts are laid up with stone that crumbles to pieces under the weight of the first locomotive that passes. There may be two reasons assigned for this kind of construction, viz: the great haste, which is a characteristic of the American people, and the false economy of building a road as cheaply as possible. These are some of the reasons why there is so much cheap and rapid railroad building in this country, the consequences of which are well known to experienced men; but those directors who are having their first experience in the business have but a faint idea of the amount of money they have wasted by being in too much of a hurry.

They have built a road and put it in operation in a remarkably short time; but such a road! The first thing to be done now is to expend thousands of dollars in putting the road in a safe condition. The line is strewn with wrecked cars and locomotives, and everything is in confusion. Reconstruction, with its enormous expense, must now take the place of what would have been ordinary repairs if the first construction had been performed in a thorough manner. *There is nothing made in putting a road in operation and building it afterwards.* The reason why so many of our roads do not pay expenses the first two or three years is, that the reconstruction account keeps the purse constantly empty. Directors of roads now in course of construction will do well to stick a pin here.

The contract system in this country is the cause of much trouble and expense to railroad companies, and a great deal of shammy railroad work is done by contractors, which they manage by sharp practice to get accepted by the company. There are some branches of railroad construction which are comparatively safe in the hands of contractors. Heavy masonry, bridge-building, etc., is likely to be done in a thorough manner by contractors, for obvious reasons. There is, however, a great deal of work done under contract, and accepted through fraud or ignorance on the part of those in charge for the company, that would disgrace any civilized community. Track-laying and ballasting should be done by the company, under the superintendence of a competent person. The life of rails may be greatly prolonged by proper care in laying them, and contractors have no interest in the matter but to do the work as fast as possible, and get their pay for it. This shammy work will usually be accepted for reasons above-mentioned, viz: an uncontrollable desire to get the road in operation as soon as possible, regardless of consequences. It is the common practice, as soon as the road bed is ready for the iron, to abandon every consideration of safety and durability; and here is the source of a vast amount of trouble and needless expense to almost every railroad company in the country. There are now hundreds of inexperienced railroad directors all over the country superintending the construction of new roads, and to such I would say: *Build your roads before putting them into operation, and you may stand some chance of a dividend.*

COLORADO RAILROADS.

DENVER, Colorado, May 20, 1871.

TO THE EDITOR OF THE RAILROAD GAZETTE:

My former communication from Longmont appeared with your caption of "A Colorado Railroad Center." This unction is flattering to the souls of Longmont, but I am not yet convinced that that locality can ever aspire to the dignity of being a railroad center. Its relation to the agricultural and mining districts will eventually make the town an important station on some road, but it can only become a "center" when the Pine Bluff road, connecting the Union Pacific with the mining districts of the territory, is intersected by a road running parallel with the mountains, uniting the northern and southern portions of Colorado. Until then Denver City must remain the railroad center. Add to the roads now in operation to Denver its wealth, population, energy and brains, and you will have the sum of the great advantages it possesses over all other localities in Colorado for being its railroad center. It is, however, too early in the history of the territory to assign an undisputed position to any particular locality. The territory is vast in extent, and its resources but little known. On the western slope are numberless acres of land exceeding in beauty and productiveness those now occupied on the east side of the mountains. A fortunate stroke of a miner's pick may at any moment disclose the now hidden wealth which is to develope the future metropolis of Colorado, but whether Denver on the eastern plains will retain its pre-eminence, or a now unknown district in the mountains suddenly arise to claim the championship of Colorado, or, as seems more in the coming future, on one of the western slopes of the Rocky Mountains, magnificent and fertile beyond description, shall center the influence of the Great West, only the future can determine. But the wise and enterprising people of Colorado are not like Mr. Micawber, waiting for something to turn up; they are using present advantages and making the most of what has already been disclosed. Your map will show you how the once frightful "Great American Desert" has been shorn of its terrors. The roads in active operation to Denver are the Denver & Pacific, from Cheyenne; the Boulder Valley road, connecting with the Denver & Pacific at Hughes' Station; the Colorado Central, opened to the beautiful and prosperous town of Golden City, situated at the base of the mountains, and already known for its numerous manufactories; and the Kansas Pacific. A road of no less local importance to Denver is now in progress of rapid construction—the Denver & Rio Grande Railroad—designed to tap the rich arteries of trade of New Mexico, Mexico, Arizona, and, *via* the Southern Pacific, giving a new route to California. This road will probably be in working order during the present season as far south as Pueblo, and will open a rich country for the merchandise of Denver, and, I may add, of Chicago, for I have observed that your dealers are well and widely known and patronized throughout the whole West. To complete the list, comes the extension of the Colorado Central from Golden City to the mining districts of Georgetown and Central City, which is of great public interest as a test of the value of a railroad into the mountains. Will a railroad from Golden City to Georgetown pay? No one knows; everybody says "yes," and all hope that capital may respond in the affirmative. The route has been surveyed, and a narrow-gauge road pronounced feasible by competent engineers. Unfortunately, the internal working or the company has not been harmonious, and at the recent corporate election the "outs" went in and the "ins" went out, and the friends of the successful party are confident that the new officers will obtain the necessary funds to resume work on the route this summer. The other party is not so hopeful, and fear the change has delayed the consummation of the enterprise. It is useless to give the names of those who rumor says are expected to furnish the capital for the construction of the road, as there has not yet been anything more known to the public from reliable sources. In the event of the road being built, the change of gauge will be at Golden. As to what traffic the road will have, I conclude with the following extract:

"The statistical committee of Gilpin County have made an elaborate report in the *Register* of the business of the county, from which they estimate that a railroad to the mines would secure the following freights:

UP FREIGHTS, DAILY.	*Tons.*
General merchandise	20
Forage	12
Flour	4
Coal for engines	85
Coal for domestic use	27
Express freight, lime, lumber, bricks, etc	1
Total, daily, up freight	149

DOWN FREIGHTS, DAILY.	
Smelting ore	115
Total, both ways	264

Passenger travel at present, 20 persons daily."

As the mines are developed, the traffic up and down the road would rapidly increase, and rumor says that English money will then erect costly smelting works at Golden City. So let it be. E. E. B.

TO CHEAPEN THE COST OF RAILROADS.

TO THE EDITOR OF THE RAILROAD GAZETTE:

After all our experience it seems to be a mooted question whether the public ought to afford assistance to a company in the construction of a railroad, and, if so, to what extent this aid should be rendered. Experience has shown that most of our railroads, while they have been of great benefit to the public at large, have frequently afforded but little pecuniary remuneration to the stockholders who constructed them. Generally the public are the gainers. Occasionally a community having no railroad facilities, and realizing that the value of their produce will be enhanced in proportion as they diminish time and cost of transporting it to market, feel the necessity of constructing a railroad; perhaps, laboring under the monopoly of a single road, they deem it important to secure the advantages arising from the competition of an additional line, and not receiving aid from any quarter they resort to the most desperate methods to raise the funds which will enable them to do so. They mortgage their property for this purpose, trusting in part that the dividends of the road will ultimately enable them to relieve themselves from these encumbrances. But perhaps, ere its completion, a financial crisis, similar to that of 1857, comes upon them, and, like many of the farmers in Wisconsin at that period, they are obliged to sell out their farms at a great sacrifice in order to meet their obligations. In many instances such a result would doubtless be avoided by previously ascertaining precisely what sort of a road their circumstances require, which will, of course, depend on the nature of the country and the amount of travel and traffic. This should be accurately determined, since it will afford the correct data for estimating how much they can afford to expend on the road. Various lines connecting the termini should be judiciously run, of which one, perhaps, is straight, but with heavy grades; another level, but with many curves; a third short, but with much earthwork, etc., etc. All these should be carefully equated, for distance, length of curves, grades, excavation and embankment, right of way, relative travel and traffic, etc. This is done by first ascertaining what additional distance the curves, grades, etc., are equal to, then adding these equivalent lengths to the measured length of the road, and calling the sum the equated length, and using this equated length to calculate the cost of working the road. Careful attention to these preliminary estimates and subsequent good management, would insure in a great measure against the bankruptcies which so frequently occur, arising out of too heavy investment in the original cost of constructing a railroad. The character of the road should be governed by the purpose which it is intended to subserve. A railroad for local business only is a very different affair from a trunk line. If the country is sparsely settled, so that the traffic will naturally be light, very heavy grades are admissible, since it will not be required to draw very heavy loads over the road. This will save a great expense in excavation and embankment. The following examples are cited to show that heavy grades are allowed, of almost any steepness, even upon important lines. Thus the Boston & Albany Railroad has a grade of 83 feet per mile for a distance of one and a half miles. The New York Central, in coming out of Albany, has a grade of 100 feet per mile for a short distance. The Chesapeake & Ohio (formerly Virginia Central) has a grade of 296 feet per mile, and loads of 40 tons are (or were) drawn over it. The Baltimore & Ohio road has a grade of 116 feet per mile for a distance of seven miles. The Pennsylvania Railroad has a grade of 95 feet per mile for a distance of 10 miles. The Mississippi & Missouri road (now part of the Chicago, Rock Island & Pacific) had temporary grades of from 126 to 146 feet per mile, up which an engine of twenty tons hauled six passenger cars with ease.

Numberless instances might be cited, but the preceding are sufficient for the purpose in view, showing that it is not necessary to go to the expense, especially on roads of a local character, or of minor importance, over which maximum loads will not have to be drawn, of excessive cutting and filling. Besides, a high grade may be temporarily surmounted by a zig-zag track, or alternately running backward and forward. As travel and traffic increase, if deemed desirable, the grade may be subsequently cut down.

Railroad Earnings for April, and from January 1 to May 1.

The following statement and comments we take from the *Commercial and Financial Chronicle* of the 20th inst.:

Nearly all of the roads included in the list below show an increase in their earnings for April, 1871, compared with the same month of 1870, and the decrease of $27,283 on the Ohio & Mississippi, and $96,430 on the Union Pacific, have no particular significance, as the former road has already earned $93,765 more in the past four months of this year than in the same period of 1870, and the Union Pacific, while showing a decrease in gross traffic, is also making such an important saving in expenses as to make the net earnings larger than last year. The Central Pacific shows an increase of $122,492; Chicago & Alton, $45,615; Illinois Central, $33,574; Milwaukee & St. Paul, $40,751, and Toledo, Wabash & Western—the largest increase of any road—$125,511.

The month of April was rather favorable for the railroads than otherwise, and the weather generally such as to favor both the passenger and freight business, while the movement of some kinds of cereals on the Western roads was considerably larger than in the same month of 1870. In January the net increase on 14 roads was $410,836; in February the net decrease on 12 roads was $1,304; in March the net increase on 12 roads was $514,600, and in April the net increase on 12 roads is $509,194.

RAILROAD EARNINGS IN APRIL, 1871.

	1871.	1870.	*Inc.*	*Dec.*
Central Pacific	$756,250	$633,758	$122,492	....
Chicago & Alton	393,654	348,039	45,615	....
Cl'v'd, Col., Cin. & Ind.	283,399	246,046	37,353	....
Illinois Central	588,661	555,087	33,574	....
Marietta & Cincinnati	118,173	106,246	11,927	....
Michigan Central	470,713	412,930	57,773	....
Milwaukee & St. Paul	483,884	443,133	40,751	....
Ohio & Mississippi	243,653	270,933	....	$27,283
Pacific of Missouri	285,416	279,543	5,873	....
St. Louis & Iron M'nt'n.	129,590	101,265	28,325	....
Toledo, Wabash & W'n	444,210	318,699	125,511	....
Union Pacific	584,540	680,970	....	96,430
Total	$4,782,130	$4,396,649	$509,194	$123,713

The prospect of large earnings in the current month seems to be very good—the freight movements of the interior will probably exceed those of May, 1870, and the passenger traffic should also be increased, particularly on those roads leading to the Pacific coast, as the disturbances in Europe will have an important influence in turning the tide of pleasure travel towards California during the rest of the season.

The statement of earnings for the past four months of the year is quite satisfactory. It seems evident that the tendency of railroad business is towards an increase, as shown by the returns given below; and the large earnings which have been made in several years since the war, are apparently not exceptional, but will be continued and increased with the growth of the country. The latest reported earnings of Rock Island and Chicago & Northwestern (these roads having an arrangement for sharing certain specified expenses and profits) have been as follows: The Northwestern road reports for the ten months, ending March 31:

RECEIPTS.

	1869-70.	1870-71.
Gross earnings	$10,438,453	$9,811,171

Decrease in 1870-71 $617,281.82, equal to 5 92-100 per cent.

TOTAL CURRENT CHARGES.

	1869-70.	1870-71.
Operating expenses, taxes, interest, etc.	$8,850,225	$7,287,331

Saving in the above items in ten months, in 1870-71, $1,562,894, equal to 17 65-100 per cent.

Rock Island as follows:

	—*December.*—		—*January.*—		—*February.*—	
	1870.	1869.	1871.	1870.	1871.	1870.
Gross earnings	$393,468	$465,032	$387,172	$401,275	$361,871	$449,654

A similar conspicuous improvement in net profits (against a decrease in gross earnings) to that shown by the Chicago & Northwestern road, is seen on the Union Pacific, the latter reporting an increase of $358,166 in net earnings for three months from January 1, while the gross receipts were $214,511 less than last year.

EARNINGS FORM JAN. 1 TO MAY 1.

	1871.	1870.	*Inc.*	*Dec.*
Central Pacific	$2,392,685	$1,929,370	$463,315	....
Chicago & Alton	1,450,128	1,288,079	162,049	....
Clev'd, Col., Cin. & Ind.	1,133,534	918,604	214,930	....
Illinois Central	2,400,461	2,446,584	....	$46,123
Marietta & Cincinnati	516,020	396,077	119,943	....
Michigan Central	1,773,808	1,459,579	314,229	....
Milwaukee & St. Paul	1,585,586	1,599,127	....	13,514
Ohio & Mississippi	1,032,786	939,021	93,765	....
Pacific of Missouri	1,060,456	1,045,423	15,033	....
St. Louis & Iron Mountain	518,440	391,696	126,744	....
Toledo, Wabash & West'n	1,531,630	1,165,305	366,325	....
Union Pacific	1,937,937	2,248,876	....	310,939
Total	$17,333,471	$15,827,741	$1,876,335	$370,603

This shows an increase of 24 per cent. on the Central Pacific; 12½ per cent. on the Chicago & Alton, 23 per cent. on the Cleveland, Columbus, Cincinnati & Indianapolis; 30 per cent. on the Marietta & Cincinnati; 22 per cent. on the Michigan Central; 10 per cent. on the Ohio & Mississippi; 1½ per cent. on the Pacific of Missouri; 33 per cent. on the St. Louis & Iron Mountain; 31 per cent. on the Toledo, Wabash & Western; and a decrease of nearly 2 per cent. on the Illinois Central; less than 1 per cent. on the Milwaukee & St. Paul, and 16 per cent. on the Union Pacific.

RAILROAD GAZETTE

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CONTENTS.

Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the RAILROAD GAZETTE, *if not previously published,* FREE OF CHARGE. *They are invited to send us drawings or models and specifications. When engravings are necessary the inventor is expected to furnish his own engravings or to pay for them.*

Engineering and Mechanics.—Communications and correspondence relating to these subjects should be directed to M. N. Forney, No. 72 Broadway, New York. Subscriptions and advertisements will be received at the New York office, and any other business transacted with those to whom that office is most convenient.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

☞ *Our Prospectus and Business Notices will be found in the last page.*

*THE KANSAS CITY BRIDGE.

The peculiar difficulties encountered and overcome during the progress of this work, lend to it an interest far greater than the magnitude of the work itself would otherwise call for. The practical engineer will readily appreciate the difference between carrying on a work of that character in a locality where settled civilization has placed work-shops and foundries at hand and material within easy access, and the prosecution of engineering work requiring the aid of such appurtenances on the borders of civilization, where mechanical conveniences are almost unknown. There the engineer needs to be as fertile in expedients as was Robinson Crusoe, and the record of the one has something of the romantic interest that belongs to the story of the other. So this detailed report of the construction of this bridge gives a history of obstacles met and overcome which can hardly fail to interest and to instruct all who have to do with such structures.

The practical engineer will, of course, only be satisfied by a careful study of the report itself, knowing, as he does, that modern engineering is advanced more through the repeated trials and failures of the profession than by any other means. For this reason it is much to be desired that every engineer engaged upon work involving difficulties new or peculiar should publish not only the successful methods employed, but also the plans abandoned on account of failure, giving them to the world as beacons placed over hidden difficulties. In the work before us, this plan has been carried out, and, in addition, the causes of the failure of the various plans abandoned are as far as possible pointed out.

The idea is well expressed in the report itself: "It is "admitted that many of the plans were very different "from those which, in the light of present experience, "it would be wished to adopt; but it is believed that a "narrative of the difficulties and temporary failures on "this pioneer work may prove more interesting and "instructive than would be the account of the more "matured plans of a second undertaking."

Contrary to the popular idea of bridge building, the superstructure, or bridge proper, presents but a small part of the difficulties encountered. Susceptible as it is of exact mathematical computation and reduction, it can be investigated throughout by the application of known and fixed laws, and definite plans can be formed, the fulfillment of which can be relied upon with certainty, economical considerations only affecting the result. Accordingly we find in the report but little space devoted to the superstructure, the draw span alone being completetely analyzed, and the character of its *strains* illustrated by simple examples and a diagram of the curve representing its moments. Only numbered line elevations and tables are furnished for the other spans. A more detailed account, however, is given to the foundations, which offer at once difficulties, a complete knowledge of which can only be obtained in detail, as they present themselves during the progress of the work, allowing but little opportunity for forethought in providing against them.

In the present case we have combined a swift current and an ever-shifting sandy bottom, covering at but a short depth a hard, rock bottom. The latter feature, of course, offers many economical advantages in the piers, but the shallowness and unstable nature of this covering render the ordinary methods of anchoring false-works and caissons impracticable and compel the use of expensive substitutes, involving numerous failures and disasters before the object desired is satisfactorily accomplished. It is here that the skill of the engineer is tried most severely. Unable as he is to calculate with any certainty upon the results of the plans proposed, he can only by constant and unceasing attention to each development and a quick conception of a ready substitute for any failing part of the plan, successfully combat each new difficulty as it presents itself. From the detailed account of such difficulties, and the expedients used to overcome them, the reader can easily appreciate the real work of an engineer—scientifically overcoming difficulties opposed to practical results.

Taking a general review of the report in order, we find, first, a history of the *scheming* that preceded the final arrangement under which the structure was built, including the numerous advantages claimed, as opposed to the bridge at that time contemplated at Leavenworth, and a general account of the results to be expected from a successful completion of the work; second, a review of the region of the river and tributaries, and a discussion of the location adopted; under the head of "Foundations" is given a detailed description of the progress of the work upon each pier. Among the peculiarities we note the method of securing the posts of the false-works to the rock-bottom, by means of iron drills worked through the center of the tube-like post, aiding the descent of the post through the sand, by forcing a stream of water through the same passage. This method of using the water jet was also applied to clear the sand from the edge of the caissons while sinking them to the rock. The method of bracing the piles, by means of collars dropped down around them, and diagonal tie-rods, is, if not novel, certainly peculiarly well adapted to the purpose.

As far as practicable, the force of the current was employed to scour the sand from beneath the cribs and caissons, and thus was utilized to some extent the most troublesome enemy of the progress of the work—the rapid current.

For the employment of a new method of sinking caisson piers without the use of compressed air, the engineers have applied for a patent. The method consists essentially of a system of dredges worked through wells left for the purpose in the masonry, so constructed as to be self-feeding—a method of undoubted utility, if not novelty.

The proper schedules of outfit, summary of expenses, and appendix of tables, are followed by ten large plates of plans and machinery. The work is also embellished by several fine lithographic views of the bridge and piers in several stages of progress, and the whole bound in a form both attractive and substantial.

Altogether, Messrs. Chanute and Morison have given us in this monograph a substantial addition to American engineering literature. The river which they were the first to bridge, and which offered obstacles seemingly almost insuperable, will soon be spanned at several points. Near its mouth, at St. Charles, a bridge is very nearly completed. At Omaha, work is steadily progressing, not to be suspended again, we presume, until the work is completed. At Leavenworth the substructure of a similar bridge is nearly completed. Something has been done at St. Joseph, and that city is not likely to remain long without one. About half way between Kansas City and St. Charles, the Louisiana & Missouri River Railroad will soon construct a viaduct. The Missouri, with its treacherous and shifting bed, has ceased to be considered a formidable obstacle. The later bridges have been constructed with comparatively little difficulty. The mistakes and the successes of the authors of this report have done much to make the way smooth for their successors, as they will also serve as a warning and a guide to bridge-builders on similar streams hereafter.

*The Kansas City Bridge, with an account of the regimen of the Missouri River, and a description of methods used for founding in that river, by O. Chanute, Chief Engineer, and George Morison, Assistant Engineer. New York: D. Van Nostrand.

MACHINE DRAWING.

We have received from Mr. E. Miller a set of lithographs showing the arrangement and construction of his trussed platforms and automatic couplers, and also a copy of "directions" for doing the work. The lithographs are among the most complete representations we have ever received for doing this kind of work, and master car builders who are about to apply these inventions will find that much work and time will be saved by having the directions so clear and explicit.

The value of drawings so carefully and accurately made none but those who do the work or direct how it shall be done can appreciate. Every part is distinctly shown, and the dimensions clearly marked, and not only are all the details represented, but the templates from which the work is laid off are also drawn, so that a workman is not obliged to employ his time and exercise his ingenuity in devising the means of doing what is to be done, but he has full instructions how to begin, how to execute, and how to finish the work.

It is a fact which must be regretted that the work of a good draftsman is generally so little appreciated. Many cars and locomotives are built in which the grossest blunders are made, simply because the work is not carefully laid down on paper before it is shaped into wood and iron. It is impossible for any one, no matter how skillful he may be, to get a clear idea in his mind of all the relations of the different parts of so complicated a machine as a locomotive, and engines which are built by men who are so "practical" that they can have their patterns made from marks scratched with a sharp stick in the dirt of a foundry floor and their figures from chalk sketches on rough boards generally have peculiar characteristics of crooked pipes and rods, and an appearance of being generally "mixed up."

It is also very significant that it is only those who know or understand nothing about drawing who think that a draftsman's work is useless. An engineer or mechanic who can tell how a piece of work will look when finished, by making a drawing of it, and can see it in its true relations and proportions by laying it down on paper, finds out very soon that it is much easier and cheaper to try experiments and alter designs with a pencil than to change the work after it is completed in the shop.

The amount of work which can be saved and the blunders which are avoided by a skillful draftsman will much more than pay his wages ten times over, and machinery which is carefully designed by a competent person is always better than that built from drawings as unreliable as are those which are "writ on sand."

A poor draftsman, or one who is careless or inexperienced, will often be worse than none, because his blunders will mislead and cause confusion and loss to his employers. But this only shows the value of one who "knows his business." It is true that very often young men will be able to make good drawings but have not the practical knowledge to be able to design work so that it can be done with the least labor. The difference in this respect between one who has the experience and also the ingenuity to make designs so that it will cost the least amount of money to do the work will amount to ten or a hundred times the difference in the amount of their salaries. We have known Railroad companies to hesitate about paying a few hundreds of dollars per year more for a good man and put a stupid blunderhead in his place whose mistakes would cost his employers fifty times the difference in salary. A good draftsman's services compared with those of a poor man's are always worth more than the the difference of salary demanded. It would, of course, not be true to say that a man might not ask for a higher salary than he is worth, but in all the cases we have ever heard of, employers have always made a poor bargain by letting the good man go and taking a poor one at a lower price. A good draftsman is nearly always worth whatever salary he will ask for, and a poor one is not worth shop room.

LOCOMOTIVE SPECIFICATIONS.

In ordering locomotives and other machinery, railroad companies are not unusually the victims of disappointment because their orders are not made sufficiently specific. Although engines may be manufactured by the builders without any purpose to defraud the purchaser, disappointment very often results from the ignorance of the manufacturers of what the purchaser wants. The successful, or rather the satisfactory, working of locomotives also depends to a great extent upon the degree to which their design and construction conforms to the ideas and prejudices of the parties who use them, so that in buying machinery it is always well to consult the parties who use it and have them specify carefully all that they want. By describing accurately all the parts of an engine, the danger of errors, omissions and mistakes from inadvertence will to a great extent be avoided. We remember once seeing an order for locomotives to go to Cuba which specified that the smoke-stacks should be made of copper. It so happened that no one about the works had ever been to Cuba or knew that in tropical countries corrosion takes place so rapidly that it is necessary to make locomotive chimneys of copper instead of iron. They consequently concluded that specifying copper stacks was an error. We also remember some eight-wheeled engines built for the Baltimore & Ohio Railroad years ago by one of the best builders in the country, and which were made with four flanged tires. Now it so happened that the curves and switches on this road are so short that it is impossible to run such engines over it with all the wheels flanged. The result was that the forward tires had to be removed and a pair with flat treads substituted. Had the specifications for these engines been carefully prepared, no such mistake could have occurred. It would be easy to multiply instances of this kind—cases where cast iron is substituted for wrought, boiler seams riveted with a single row of rivets where only double rows would be strong enough, and double rows spaced so that they gave even less space than one. All such blunders could be avoided by the exercise of a little care and skill in preparing the specifications by which machinery is ordered.

We have been led into these remarks by the receipt of a most luxurious volume from the Grant Locomotive Works, descriptive of the engines built at that establishment. The book is printed on heavy tinted plate paper, and contains twelve photographs representing the different patterns of locomotives built there. It has also eighteen photographs showing the details of the engines and the manner of their construction. The description we reprint on another page, and it will be found a very concise summary of locomotive construction, and will furnish a good model for preparing specifications. Of the manner in which work is done at this establishment, we will leave the description to speak for itself.

Some of the photographs are quite curious, and all are interesting. The first one of the details of the engines is a picture of the *inside* of a boiler, showing the braces, stays and crown-bars. It was taken by placing the camera in front of the hole in the front tube-sheet, which receives the dry pipe. Sun-light was then reflected in with two mirrors. The picture is very distinct, considering the conditions under which it was taken. The book also contains photographs of the frame, the side of the fire-box, showing the arrangement and location of the injector, the cylinders, the steam-chests, valve and valve-stem, piston and cross-head, guides and guide-yokes, rockers and rocker-boxes, valve-gear, connecting rods, eccentrics, driving-wheels, axle-boxes, truck, pump, throttle-valve, steam-pipes, and the back end of an engine, showing the arrangements in the cab. In nearly all cases, the parts are shown in several different views, and, as far as possible, the gauges by which the work is finished are shown in such relation to the different parts that the manner in which they are used is easily discernible. Everything is fitted to templates or gauges, which are fully described in the text.

The book also contains tables which give the principal dimensions of all the different classes of engines built. The vignette in front is from a steel-plate representing the locomotive "America" and the reverse sides of the gold medal which was awarded for this engine at the Paris Exposition.

Altogether, the book is one of the most luxurious volumes ever published in this country, and, certainly, articles of manufacture have rarely been illustrated so elaborately. The book was printed by the "Aldine Press," by James Sutton & Company, and is a model of typographical taste and execution. The photographs were taken by Rockwood, who makes this kind of work a specialty.

COAL BURNING.

Locomotive engineers have had no tougher problem to solve than that of burning coal successfully and economically. After years of experience and experiment our practice has not materially changed, except in the proportions of boilers. Of all the patented devices which have been introduced, the only ones which are now in successful use are those designed by Mr. Jauriet, of the Chicago, Burlington & Quincy, and Mr. Buchanan of the Hudson River Railroad. In some few places the fire-brick arch is used, and we have recently seen engines at the Rogers Locomotive Works provided with a sheet iron deflector over the furnace door. Except it be in some very exceptional cases, we believe these are the only devices for burning coal which are applied to the ordinary plain fire-box.

It is not our purpose to discuss the merits of these arrangements, but to consider the conditions which should be observed in order to secure the best results from the combustion of coal in a common locomotive boiler. The difference in effect produced by coal burned under favorable conditions, and in a boiler properly proportioned, and that resulting from its consumption under circumstances which are unfavorable, as every fireman knows, will often amount to from 50 to 200 per cent. It is therefore well worth while to study carefully the proportions of boilers and the system of working them. The problem is not a very simple one, nor, probably, will its solution be effected by any one's special hobby. There are so many elements to be taken into account in considering the subject of coal combustion, that unless a person has somewhat of the deliberative faculty, he is likely to overlook some of them, or else not give due weight to others.

The first efforts at burning coal in locomotives in this country were made when the supply of wood began to diminish, and in engines built for burning the latter fuel. The size of the fire-box required for burning wood being very much smaller than that needed for coal, a great deal of difficulty was experienced in making steam enough with the old boilers. After much disappointment and failure, the necessity of having a large grate surface for burning coal was discovered, and the engines were proportioned accordingly. About the same time the rage for large driving-wheels prevailed, which required cylinders of proportionate capacity and frames, etc., heavy enough to correspond. The result was that the weight of the engines soon exceeded that to which they were limited by the character of the road-bed and other considerations, and the boilers therefore could not be made any larger. Since that time the practice of locomotive builders and master mechanics has been a sort of vacillation or compromise between big wheels and big boilers.

That a large boiler will make more steam than a small one, is so obvious that it seems hardly necessary to state it. But that it is therefore not necessary to force the former so hard as the latter in doing the same work is an inference which, notwithstanding the self-evident character of the first proposition, is often lost sight of. Now, if instead of an iron horse we take one of flesh and blood, most of our readers would realize that it would be impossible to get the greatest amount of work out of him if he was driven so that he must exert all his strength to draw the load or make time. Now the same thing is true of a boiler. If the fire is forced, there will be a great waste of fuel, heat and power.

For example, in order to get draft enough to stimulate the fire in a small fire-box, it is necessary to contract the exhaust nozzles. The back pressure on the pistons is thus increased and causes a serious loss of power. In the second place, the draft is so violent that the fire is torn to pieces and large quantities of fuel are carried up the chimney unconsumed. The motion of the smoke and gases being very rapid, there is not time for combustion to take place before they enter the tubes, nor for the heat they contain to be transmitted into the water in the boiler. In a large boiler it would not be necessary to force the boiler so much, and therefore the exhaust nozzles need not be contracted nor the evil of increased back pressure be incurred. Combustion would be slower and the fuel and much of the smoke would be consumed instead of being carried up the chimney A large boiler has also other advantages in its greater capacity for carrying water. There are on nearly all roads places where it is difficult to guarantee steam enough to haul a heavy train or make time with a fast one, whereas on other parts it is easy to keep a supply of steam and to spare. Now a large boiler, having capacity to carry a great deal of water, can be pumped full, and the latter can be heated to a temperature equal to that due to the working steam pressure, so that on reaching a grade there is that much power stored up to be used as necessity may demand. On a steep grade, for example, if all the steam which is consumed must be generated at the time, the fire probably would require forcing up to its utmost limit, whereas, if there is a large boiler full of hot water which can be borrowed to help during the emergency, the engine can thus get over the most difficult places easily, and without forcing the fire.

If the latter expedient is resorted to, the fire will be torn by the violence of the draft, and much of the fuel will be lifted from the grate. When an engine with insufficient boiler capacity and a heavy load is struggling up a grade, on looking into the furnace it will be seen that pieces of coal, some as large as walnuts, are dancing up over the surface of the fire, and the smaller ones are carried into the tubes. The engine and train will be covered with sparks, and bushels of them will be collected in the stack if it is large enough to hold them. Heavy wire netting will be cut into shreds in a half a dozen trips, and some idea is obtained of the speed at which the smoke and gases are carried through the tubes by observing at night the swiftness with which live sparks are projected from the top of the stack. Now just in proportion to the capacity of the boiler can the exhaust nozzles and the attending evils of a violent draft be decreased.

We have, therefore, come to the conclusion—to which, perhaps, not all of our readers will assent—that the larger a locomotive boiler is, the more economically it will make steam. Of course the weight of the engine imposes a limit to the size of the boiler, but there is never any danger of getting it too large so long as the limit of weight is not exceeded.

In consideration of this fact, the most economical use of material without a sacrifice of strength is a subject not only involving the question of economy of construction, but also that of economical combustion. Every improvement in the quality of material furnishes just that much additional means of enlarging the size of the boiler without increasing its weight, and the more skill exercised in designing the machinery so as to reduce its weight without lessening its strength, the heavier the boiler may be; or, in other words, the lighter the machinery, the more weight can be put into the boiler without making the engine too heavy.

THE CHICAGO, DANVILLE & VINCENNES RAILROAD.

One of the most important lines—for Chicago perhaps the most important—now in progress is the Chicago, Danville & Vincennes Railroad, which was begun about two years ago, and has been in operation for some time to St. Anne's, in Kankakee County, and within a few days has been completed to Watseka, in Iroquois County, where it intersects the Toledo, Peoria & Warsaw Railway. The progress of the road has not been very rapid, but it has been certain and steady, and the work is now in such condition that the managers are sure that the road will be ready to bring in the summer's crops from Danville and Terre Haute, and, if no unexpected delay occurs, the line will be completed by the middle of August.

For the present this road depends upon the Pittsburgh, Cincinnati & St. Louis Railway for an entrance into Chicago. It uses the latter line as far as Dolton, 20 miles south of Chicago, and that is at present the northern terminus of the road. Thence it extends nearly due south to Danville, on the Toledo, Wabash & Western, a distance of 108 miles, and from Danville has a southeast course of eight miles to the Indiana line, where it will be met by the Evansville, Terre Haute & Chicago Railroad, which is completed from that point to Terre Haute, and there makes a connection with the Evansville & Crawfordsville Railroad.

Thus the completion of this road will not only give a new and direct road from Chicago to Danville, with the business of the country on the line, but a north and south line from Chicago to the Ohio River, and connections beyond which already reach to Nashville, Tenn., to Decatur, Ala., and will soon (by the completion of the North and South Alabama) extend to Montgomery, Ala., and to Mobile and Pensacola on the Gulf. The very situation of these roads makes it necessary to operate them in harmony, as far as Nashville at least; and it is natural to suppose that when a direct line is opened on a new route from Chicago to Nashville this city will be able to maintain business relations with the towns and country on the route, which, for the most part, have traded little with Chicago because it was not easy to get here. What is striking in this case is, that the construction of 150 miles of railroad from Chicago southward brings us to a railroad system already in operation which extends 300 miles farther south. By this route the distance from Chicago to Danville will be 128 miles; to Terre Haute, 179 miles; to Evansville, 288 miles; to Nashville, 445 miles; to Decatur, Ala., 567

miles; to Montgomery, Ala., 750 miles; to Pensacola, Fla., 914 miles; to Mobile, 936 miles. The distance to the Gulf is about the same as by routes now in operation, it being 857 miles to Mobile *via* Cairo and 913 miles to New Orleans. But the route to Pensacola will open a new Gulf port to Chicago, for hitherto the approaches to it have been so circuitous that it has rarely been visited from the north. However, the business south of Nashville, however great it may be to Chicago, is not likely to afford the Evansville line any considerable traffic, as the Louisville & Nashville Company has obtained control of the line from Nashville to Montgomery and will probably insist on sending it by way of Louisville, by which route the distance is about 40 miles greater.

But we must not make the common error of valuing the traffic of places in proportion to their distance from us. The Chicago, Danville & Vincennes Railroad, like other Western railroads, will find its chief business along its line. It has an exceedingly fine and well settled and cultivated country, and is not too near parallel routes. At Bloom, ten miles south of Dalton, it is four miles east of the Illinois Central, and this distance increases to ten miles at Momence, fifteen miles at Watseka and thirty-one miles at Danville. On the east the nearest parallel line is the Louisville, New Albany & Chicago, which is from 35 to 40 miles distant as far as Danville, within thirty miles part of the way between Danville and Terre Haute, and from Terre Haute to Evansville, from forty to eighty miles. It will be crossed by a great many lines, probably within a year by six between Chicago and Terre Haute; but as the business of the State, at least as far south as Terre Haute, tends towards Chicago, these cross roads are likely to bring it more business than they take from it.

A traffic of special value, both to the road and to the country, will be the transportation of coal on this line. Besides crossing extensive mines in Vermillion County, it will open the shortest line to the mines of "block coal" in the vicinity of Brazil, Ind., sixteen miles east of Terre Haute. This coal is known to be unexcelled for iron smelting and working, and a cheap supply of it where iron and iron ore can be cheaply obtained will give the opportunity for a great manufacturing business. There are already in and near Brazil a number of smelting furnaces, and they will use a large amount of Lake Superior ore, which this railroad can most readily bring them, while the transportation of coal for manufactures of iron in Chicago and vicinity may be expected to become a heavy traffic. The Danville road can reach this coal by the two lines from Terre Haute which cross the field, but another, crossing the coal field from north to south, in the direction of its greatest length, is promised, which will intersect the Danville road near Danville, and bring its cars to many new mines by a route shorter than any now existing.

Other feeders to this road are contemplated: one from Lafayette northwestward, and one from Decatur, *via* Monticello and Champaign northwestward, both of which will depend upon it for an outlet to Chicago.

As we said before, the road, important in itself, is so also as the outlet to a still longer line already made and now giving little business to Chicago. That we shall be able to secure for this city as large a part of the traffic of the line south of Terre Haute as of that north of it is not probable; but with a short and straight line to Southern Indiana, and daily trains, Chicago merchants ought certainly to compete strongly with the Cincinnati and Indianapolis merchants, who have hitherto had the field pretty much to themselves, and even where we cannot sell goods we may buy produce to advantage. The new line will give us access by the shortest possible route to the east side of the Wabash Valley, as the Springfield & Illinois Southeastern has to the west side.

ERIE.

There have been many reports for the past two weeks of a transfer of this road to some new company, the first reports naming Vanderbilt as the successor of Fisk and Gould, and later rumors putting Thomas A. Scott, James F. Joy and other prominent railroad men at the head of the management. The public has, apparently, put unusual faith in these vague and incoherent rumors. It is argued that with the stockholders in the United States Court the present managers can hardly hope to maintain their positions long, and that, therefore, they must be willing to sell out.

It does not seem to occur to these people that if for such a reason Fisk, Gould and their friends are willing to sell, for the same reason Vanderbilt, Joy, or any other man with a moderate amount of common sense, must be very unwilling to to buy. These men have use for a railroad and might be willing to buy one, but they are too shrewd to buy a law suit, especially one about to be decided against them.

In the present condition of the affairs of the Erie Company, negotiations must be made with two quite distinct parties before control and a satisfactory title can be secured. The English stockholders claim to have a majority interest in the property, but Gould, Fisk and their party have possession and can offer many very ugly obstacles to any one, even a large majority of the stockholders, who may try to put them out. He who wished to purchase would hardly be satisfied with a contract with the present managers, lest their right to transfer be denied by the highest judicial power; neither would he be satisfied with a contract with the stockholders, for they are not able to deliver the property which their shares represent. If any satisfactory contract for a transfer is made at this time, it must include on the part of the Erie both the managers and the stockholders who have brought suit against them. It is possible that, under the present circumstances the present managers might resign and sell their interest for a consideration; it is also possible that, in order to secure the immediate use of their property, the stockholders might agree to recognize such a contract with these managers; and it is further possible that these stockholders will authorize some manager in whom they have confidence to make terms with the managers now in power, whom they are trying to displace, and promise said manager the charge of the property and a united support when they shall have gained control of the road. Such a combination would be a complicated and delicate one, but it is not easy to see how else, at the present time, a transfer of the property could be made.

It would seem natural that Mr. Joy should desire the Erie more than any one else. His great system of roads, including 3,000 miles or more, is complete as far as the Niagara River, but for an outlet to New York and New England is absolutely dependent on other interests, which may become hostile at any time. But his roads have close relations with New England lines with which the Erie does not and cannot connect. Vanderbilt has always been charged with coveting the Erie in order to command the traffic from Lake Erie to New York, and maintain regular rates, which the Erie is noted for breaking; but there are reasons why Vanderbilt might hesitate. If he controlled it, he would still have to divide the traffic between it and the Central, and he might reasonably fear the competition of a third line, which might, and probably would, be built from New York to Buffalo very soon, which would still further divide the traffic. There is no insurmountable obstacle to a new railroad in New York. Indeed it would not be difficult to make one considerably shorter than the Central or Erie, and we have reason to believe that the money will be ready to complete such a line the day that the Erie becomes a Vanderbilt road.

We imagine, however, that the reports have had the effect intended by those who promulgated them, and that they find their justification (sufficient for them) in the quotations of the stock market, which have lately shown Erie at 33,—a rise of 50 per cent. within a week. Whether the road is to change management or not, doubtless many have made money out of the reports to that effect.

NEW PUBLICATIONS.

Vogdes' Architects' and Builders' Pocket Companion and Price Book, is a book "consisting of," says the title-page, "a "short but comprehensive epitome of decimals, duodecimals, "geometry and mensuration, with tables of United States "measures, sizes, weights, strengths, etc., of iron, wood, "stone and various other materials, quantities of materials "in given sizes, and dimensions of wood, brick and stone, and "a full and complete bill of prices for carpenters' work; also "rules for computing and valuing brick and brick work, stone "work, painting, plastering, etc." It is a handsome and compact pocket volume, with 284 pages 5 by 3¼ inches, neatly bound in morocco, compiled by Frank W. Vogdes, an architect of Louisville, Ky., and published by Henry Carey Baird, of Philadelphia. The title page, as given above, describes very well its contents, which must be of very great value to every builder, and also to those who deal with builders, enabling them to make contracts understandingly. The price of the book is $2, and it will be sent post-paid for that amount by the publisher, Henry Carey Baird, No. 406 Walnut street, Philadelphia.

Campbell's Shippers' Guide and Travelers' Directory.—The edition of this work for 1871 is just published. It contains lists of about 35,000 places in the New England States, New York, New Jersey, Pennsylvania, Ohio, Indiana, Michigan, Kentucky, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Nebraska, Kansas, Colorado, Utah, Nevada, Idaho, Montana, Dakota and Wyoming, and indicates *all* the routes by which these places can be reached; which are on railroads, and on what roads they are; which are on rivers, with the name of the river indicated; which have express companies, and what company or companies have an office there, and for those towns which are neither railroad stations nor river landings it gives the nearest station or landing.

The valuable nature of this information is evident at once; but the degree of its value depends altogether upon its accuracy, and it is with great difficulty that accurate information can be obtained for 35,000 different places. Only protracted use of the work can demonstrate its excellence—or the want of it—in this particular, and therefore the testimonials of railroad men who for the past two years have used Mr. Campbell's guide almost constantly have the greatest possible weight. A very large number of these, including freight, passenger and express agents in Chicago and elsewhere, besides many heavy shipping firms, unite in commending the work for its completeness and accuracy. The new edition has been much improved, as well by correcting the old as by the addition of new matter. The work is carefully prepared *for sale*, and as its income depends chiefly on its sales and consequently on its excellence, it is more likely to be carefully prepared than a work which depends chiefly upon advertising and very little upon sales for its support.

Georgia Railroad Report.

The Georgia Railroad extends from Augusta, Ga., westward to Atlanta, a distance of 171 miles. It has a branch extending from Camak, 47 miles west of Augusta, southward four miles, and it operates the Macon & Augusta Railroad, which is an extension of this branch through Milledgeville to Macon, 57 miles (completed from Milledgeville to Macon, 22 miles, during the year). It owns also a branch from Barnett, 57 miles west of Augusta, northward to Washington, 18 miles, and another branch from Union Point, 76 miles west of Augusta, northwestward to Athens, 39 miles. It therefore owns 233 miles and operates 289 miles of road. The report does not include the earnings of the Macon & Augusta road. We extract from it the following:

"The receipts for road earnings have increased over the previous year the sum of $148,069.02; and the net profits—after deducting all payments on account of road, ordinary and extraordinary—have increased $39,268.68. The gross earnings of the road have been:

From passenger receipts	$395,154 65	
From freight receipts	1,082,119 71	
From mail receipts	23 825 21	$1,500,099 57

The operating expenses for the same time have been:

For conducting transportation	$228,905 41	
For motive power	273,704 77	
For maintenance of way	276,009 14	
For maintenance of cars	53 939 95	$832,550 27
Earnings over and above ordinary expenses		$667,539 30

Out of which have been paid:

For new depots	$12,023 16	
For new locomotive engines	48,857 67	
For new cars	105,232 70	
For old locomotive engines rebuilt	28,567 42	
For new tools and stationary engines	4,695 35	
For government tax on gross receipts	4,727 79	
For new culverts	1,335 92	$206,440 01
Net income		$462,099 29
Balance to reserved fund		$127,064 72

The gross earnings are thus $6,465 per mile, which, though not a very large amount compared with the receipts of many Northern roads, is large compared with the capital invested, which is only about $20,500 per mile. It has paid dividends of from 6½ to 8 per cent. on its stock since the war.

Vicksburg & Meridian Railroad Report.

The tenth annual report of the company has just been published. The company operates 140 miles of road, from Vicksburg east to Meridian, where connection is made with the Mobile & Ohio and Alabama & Chattanooga railroads. The earnings of the road for the past fiscal year, are as follows: Passengers, $220,059.04; freight, $295,483.94; mails, $14,152.47; incidentals, $10,270.71; total, $530,966.23. The increase of gross earnings over the previous year is $56,429.57. The total of expenses is 415,019.06—equal to 76 8-10 per cent. The expenditures are in excess of those of the previous year, $24,902.15. This increase of expenditure is attributable to two causes, the advance in the price of labor, and the heavier purchases of new rails, new cars and new locomotives—these items of extra expense summing up a total of $76,357.42.

During the fiscal year just closed, the conversion of the past due bonds has been continued successfully. There have been issued of the new 7 per cent. mortgage bonds due in 1890, a total of $2,798,000. There are about $140,000 of the bonds and other obligations, including interest, yet to be converted. The interest on the debt of the road has been promptly met. The floating debt of the company has, during the past year, been reduced $17,106.78, leaving the amount due on Feb. 28, 1871, $81,310.57. The amount of floating debt due March 1, 1868, was $281,015.35, showing that since that date there has been paid $199,704.78.

During the year, four miles of track have been laid with new iron, 44,938 cross-ties have been placed upon the track, and 39 trestle-bridges were renewed.

"Under reasonably favorable circumstances," says the President, "we hope to bring the operating expenses to a figure not exceeding 66 per cent. of the gross earnings."

The *through* passenger business shows an increase of 5,486 passengers—nearly doubling the number of the previous year—amounting in earnings to $47,267.67, showing an increase of $12,559.28.

General Railroad News.

CHICAGO RAILROAD NEWS.

Chicago & Alton.

This company is preparing to open its short route to Kansas City by way of Louisiana, Mexico (the towns, not the State and country), and the North Missouri Railroad. In a circular sent to passenger men of other railroads, it says that this route will be open some time next July, that it will be the shortest line between Chicago and Kansas City, and that elegant new day cars and Pullman sleeping-cars, with all the latest improvements, will be run through between Chicago and Kansas City without change, and that "fast time, comfort, "safety, and in all the luxuries of travel, this new line "will not be excelled by any of its competitors."

It must be a great improvement on the route by St. Louis, not only because of its shortness, but also because of the greater facilities for transfer which will be provided at Louisiana, by means of which cars can be and will be taken across, and passengers and freight need not be transferred.

The line from Chicago to Mexico will be operated by the Chicago & Alton Company, and but one coupon will be required for that part of the route. To Kansas City, or other points on the North Missouri, a coupon must be added. The Kansas City form will make part of the ticket to nearly all other points in Kansas, a coupon being added for the Missouri River, Fort Scott & Gulf road for Baxter Springs and other stations on that road, one for the Kansas Pacific for Denver or other points on that road, one for the Leavenworth, Lawrence & Galveston for Thayer and other stations on that road, etc. To Leavenworth, St. Joseph & Atchison the North Missouri coupon will be from Mexico to Harlem, and the next coupon will read from Harlem to destination by the Kansas City, St. Joseph & Council Bluffs road. To Waterville and other stations on the Central Branch Union Pacific a coupon will be added to the Atchison ticket, and to Marysville and other points on the St. Joseph & Denver two coupons must be added to the St. Joseph Ticket, one for the transfer from St. Joseph to Ellwood and one for the St. Joseph & Denver. Tickets to points on the Neosho Valley Division of the Missouri, Kansas & Texas will have a coupon added to the ticket to New Chicago, on the Leavenworth, Lawrence & Galveston. So to points on the Atchison, Topeka & Santa Fe a coupon must be added to the Kansas Pacific ticket to Topeka.

The new line will be called the "Chicago & Kansas City Short Line."

Chicago & Northwestern.

By the new time-table of the Galena Division, which took effect last Monday, the Pacific Express arrives at 3:15 p. m.—an hour earlier than before; the night mail arrives at 6:30 a. m., instead of 7:00, and leaves at 9:45, instead of 10:00 p. m.

On Thursday of this week a train of twenty-eight cars carried about 1,700 Presbyterian ministers and other delegates to the General Assembly in session in this city, on an excursion trip to Lake Forest and return the same day.

The annual meeting of the company will be held next Thursday. Under the new classification, the terms of five directors will expire this year.

The engineers on the Menominee Extension last week had completed the location of ten miles north of Green Bay, and had run a line 13 miles further, to and by West Pensaukee. This week they were to make a survey to Peshtigo, by way of Stiles, which is about eight miles from the bay, leaving Oconto to the east.

Illinois Central.

Since the company has been running through cars from Chicago to Fort Dodge a considerable and increasing Iowa business has been developed, a business which will soon warrant running through cars to Sioux City. The passenger traffic over the Illinois line northward has been particularly heavy for the past two weeks.

Chicago to Indianapolis.

The Indianapolis, Peru & Chicago Company, which owns the 75 miles of road from Indianapolis to Peru, has secured control of the 73 miles between Peru & Laporte of the Chicago, Cincinnati & Louisville Company, and built twelve miles more between Laporte and Michigan City. It is now proposed to secure an inlet to Chicago over the Michigan Central road from Michigan City, and it is probable that next Monday this new route to Indianapolis and Cincinnati will be opened. The passenger trains of the Indianapolis road will connect with the regular trains of the Michigan Central twice a day, and a through sleeping-car to Indianapolis will be run on the night trains.

OLD AND NEW ROADS.

Michigan Midland and Peninsular Consolidation.

The stockholders of these two Michigan companies voted to consolidate on the 23d inst. The Michigan Midland project is a line from St. Clair nearly due west to Lansing, a little more than 100 miles; but we believe that it expects to use the 16 miles of road between Ridgeway and Romeo built some time ago by the Michigan Air Line Company. The Peninsular Company has a road in operation from Lansing southwest through Battle Creek to Climax, 55 miles, which it is now extending to South Bend, Ind., and intends to complete to Chicago. Thus the consolidated company, when its road is completed, will have a line from Chicago to St. Clair, which will be about 320 miles long. At St. Clair it is intended to connect with a branch of the Canada Southern for Buffalo, by which route the distance from Chicago to Buffalo will be 505 miles, which is 35 miles less than by the Lake Shore road, and about the same as by the Canada Air Line, the Great Western and Michigan Central (*via* Three Rivers.)

Mobile, New Orleans & Texas.

This railroad was completed from a point opposite New Orleans to Donaldsonville last week, as we learn from one of the contractors. Messrs. Durant and Casement, famous for their work on the Union Pacific, were the contractors. It is intended, we are informed, to let the contract for the rest of the line across Louisiana in a few weeks. The company has secured the old road (for some years abandoned) from Houston to the Louisiana line, and will make it a part of their road. There will be a large amount of bridging on this line, chiefly across bayous.

Municipal Aid in California.

In the case of the Stockton & Visalia Railroad, the Supreme Court of California has decided that subsidies to railroads from towns and counties are constitutional.

Portland and Ogdensburg.

Fifteen hundred tons of iron arrived at Portland last week from Liverpool. This lot will be sufficient to lay the track to the State line. The track is now laid very nearly to the Fryeburg.

Milwaukee & Northern.

At a meeting in Fond du Lac, Wis., on the 23d, $25,000 was subscribed to the stock of this road. The distance from the present terminus, at Cedarburg, to Fond du Lac, is about 40 miles.

Detroit & Hillsdale.

It is again reported that this company has obtained possession of the partly graded Eel River Railroad, from Auburn, Ind., southwest to Logansport, about 80 miles, and will finish it immediately. To connect with the Eel River road, it is proposed to extend the Hillsdale line from Hillsdale southwest about four miles, to the Fort Wayne, Jackson & Saginaw road, and use that road thence south to Auburn, 46 miles.

Burlington & Missouri River.

This company is preparing to plant trees on a large scale on its Nebraska line, according to the suggestions made in an article by Mr. H. W. S. Cleveland, which was published in the RAILROAD GAZETTE of March 18, 25 and April 1. Mr. Cleveland will give general directions for the planting.

Holly Springs, Brownsville & Ohio.

Eleven miles of track are laid, and 22 miles more are graded, on this road, which is to run from Holly Springs, Miss., through Brownsville, Tenn., to the Kentucky State line, where it will be met by a road which the St. Louis & Iron Mountain Company proposes to build across Kentucky. It is said that the right of way through Kentucky for the Iron Mountain Company is already secured.

Central of Iowa.

Marshalltown is trying to secure the shops for construction and repair of rolling stock on this road, and for this object proposes to raise $45,000 in money and give land near the depot worth $15,000.

Albia, Knoxville & Des Moines.

On this road, which is to extend from Albia, at the junction of the Central of Iowa and the Burlington & Missouri River, northwestward to Des Moines, parallel with the Des Moines Valley road, and only from nine to fourteen miles distant from it, a large part of the grading is done as far as Knoxville, to which point (29 miles from Albia) the contract requires the road to be completed by the middle of December.

Missouri, Iowa & Nebraska.

About 50 miles of the railroad from Alexandria, Mo., westward to Memphis, Mo., is under contract, and it is expected that it will be completed so far by the 1st of August, and the officers hope to have it in operation about 20 miles further, to a connection with the North Missouri Railroad, by the end of the year. Between 1,500 and 2,000 men are at work on the line.

Dubuque & Minnesota and Iowa & Pacific.

The Dubuque (Iowa) *Times* of the 20th says:

"We understand that the arrangement between the Dubuque & Minnesota and the Iowa & Pacific railroad companies is fully completed and ready for signature, and will probably be signed in a day or two. That this will end in giving us the Dubuque & Minnesota Branch, and another western line through the State, and that very promptly, we have the fullest confidence. We do not understand that anything in this agreement in any sense binds either company as to the location of either line. The Iowa & Pacific Company will diverge from any point on the Dubuque & Minnesota Branch the company may desire to select as a point of departure. The location of the branch up the Turkey is wholly in the hands of the Dubuque & Minnesota road, and they may build up the Turkey or up the Volga, as they may deem best."

Potomac Railroad.

At a meeting of this company, which owns the charter of a railroad from Washingtown down the Potomac to connect with the Richmond, Fredericksburg & Potomac Railroad, the President reported the financial negotiations not yet sufficiently forward to put the whole line under construction, but that land would be condemned for the connection with the Richmond, Fredericksburg & Potomac Railroad north of Fredericksburg, for making an all-rail line to Alexandria and Washington. When the work is commenced it will be at Shipping Point, at the mouth of Quantico Creek, this branch of the line to be leased to the Fredericksburg road.

Cleveland & Cincinnati.

It is reported that the Pennsylvania Railroad Company will, after completing the line from Zanesville to Dresden, by which the Cincinnati & Zanesville will be connected with the Pan Handle, extend it northward about 30 miles to Millersburg, the present southern terminus of the Cleveland, Mount Vernon & Delaware road, and then open a new route from Cleveland to Cincinnati, which would be for 26 miles—from Cleveland to Hudson—over the Cleveland & Pittsburgh road; for 61 miles—from Hudson to Millersburg—over the Cleveland, Mount Vernon & Delaware; for about 45 miles—from Millersburg to Zanesville—over the new road to be built for the Pennsylvania Company, and for 168 miles—from Zanesville to Cincinnati—over the Cincinnati & Zanesville, or "Cincinnati & Muskingum Valley," as it is now called. Thus the total length of the line would be just about 300 miles. The route by Delaware, Springfield and Dayton is 250 miles.

Missouri, Kansas & Texas.

A party of the directors and heavy stockholders have been traveling over the different portions of this road, and on the 22d inst. returned from an excursion to the end of the track, about 50 miles into the Indian Territory. A telegram from the party announces the condition of the road and the purposes of the company as follows: "They found track-laying progressing at the rate of a mile a day. The cars will run to Fort Gibson by July 1. The bridge over the Arkansas will be done on September 1. Manager Stevens is directed to complete the grading, bridging and masonry to the south side of the Canadian River by the 1st of October next, and to have the cars running to that point by November 1. The entire party are united in the opinion that it is the smoothest and best new road over which they ever traveled. At Big Cabin, cattle yards, with ample facilities, are provided for cattle and all kinds of freight. The next station will be established on Pryor's Creek, twenty-five miles below Big Cabin, at which point the road will be open for business within the next two months. The party started from Sedalia, on their line, and will return *via* Junction City, thus traversing the entire line of completed road, 450 miles, all of which has been completed within the last two years. The contract for the transportation of all United States military supplies for forts in Texas and the Indian Territory has been awarded to the company. Already vast herds of cattle and large quantities of cotton are *en route* to the southern terminus. No company ever opened with indications more flattering for a heavy freight and passenger traffic. On arrival at Holden the party will go west to Paola, on the line progressing through Ottawa, and bearing along at or near Emporia. The plans of the company are most comprehensive, and when the road is completed, Atchison, Leavenworth, Lawrence, Topeka and Fort Scott will be connected by its main line, through the Indian Territory, with the gulf. The directors are determined that the entire line to Red River shall be open by January, 1872."

Cincinnati & Springfield.

A telegram from Cincinnati says that the directors of this company report having sold in New York, today, the balance of their issue of $2,000,000 in bonds, at 90 cents and accrued interest, and since then have opened bids for the construction of the road between Cincinnati and Dayton. It is reported also that the Cincinnati, Hamilton & Dayton is negotiating for an arrangement with the Lake Shore and the New York Central, whereby the construction of the new road would probably be prevented.

Cleveland & Pittsburgh.

The Executive Committee of the Cleveland & Pittsburgh Railroad Company held a meeting in New York May 18. An application, signed by a large majority of the stockholders, asking for a dividend of 50 per cent. was presented and duly considered. A full meeting of the board was ordered for May 30, to act upon the resolution.

Southern Minnesota.

A report has been published in Minnesota to the effect that this road has been secured by the Milwaukee & St. Paul Company. It would be very valuable either to this or to the Northwestern, and it is reasonable to suppose that either would make a strong effort to keep it out of the hands of the other.

Dubuque to St. Paul.

The St. Paul *Press* has been informed that the Boston capitalists represented by Mr. Joy intend to complete an independent line from Dubuque to St. Paul, by way of Rochester. If such a line be constructed probably it will be a branch of the Dubuque & Minnesota or Turkey River Valley line, leaving it near West Union, Iowa, and extending north by west not far from a line through Cresco, Chatfield, Rochester and Cannon Falls. It would divide the distance between the Milwaukee & St. Paul and the Mississippi, and would have a fine and wide territory on each side, unless the proposed line from St. Paul through Cannon Falls and Mantorville to Austin should be made, in which case traffic would be limited. The shortest route for this interest to reach St. Paul would be by an extension of its Mississippi River line from LaCrosse or Winona; but it is not impossible that a combination can be made with the St. Paul & Chicago line above Winona. This, it is true, is likely to be controlled by the Milwaukee & St. Paul, but the latter company seems to be on friendly terms with the Joy interest, and it is at least not impossible that they may hereafter have very close relations.

Lake Shore & Tuscarawas Valley.

The Engineer of this company, Mr. J. H. Sargent, has submitted a report of his surveys of the proposed route, which is from Berea, on the Lake Shore & Michigan Southern road, south through Medina and Massillon, and up the Tuscarawas Valley to New Philadelphia, and from there to Uhrichsville or Dennison. He says: "The nature of the country is such that very little undulation of the grade line will be required, but we encounter many small streams which necessitate the construction of many culverts, and increases the earthwork materially. Good stone for culverts and bridges is found along the whole line, but gravel for ballast upon the northern slope is very scarce."

Burlington & Southwestern.

This railroad was completed last week to a junction with the Des Moines Valley Railroad at Farmington, a distance of about 16 miles from its junction with the Keokuk Branch of the Chicago, Burlington & Quincy, and 35 miles from Burlington. Regular trains will soon run between Burlington and Farmington. The Burlington *Hawkeye* says:

"The grading west of Farmington is being pushed forward energetically by Mr. J. W. Barnes, who has the contract between Farmington & Bloomfield, and is at work at both ends of that division. He will have the road-bed ready in August, and the iron will doubtless be laid to Bloomfield by the first of October, if not sooner. From Bloomfield, fifteen miles of the track of the North Missouri road will be used to Moulton, where the road will diverge, southwestwardly, crossing the Missouri State line and passing through Putnam County. It is now understood that the road will be completed to Unionville, Putnam County, Missouri, by the first of next January."

Lebanon & Sparta.

Mr. E. F. Falconnet, Chief Engineer of the Tennessee & Pacific Railroad, has designed, surveyed and made estimates for a 2½-feet-gauge railroad from Lebanon, the present eastern terminus of the Tennessee & Pacific, east by south to Sparta, 60 miles. He has prepared a pamphlet addressed to the citizens of the counties which are called upon to subscribe the capital for the road, in which he estimates the cost of the 60 miles of road, with equipment, at $621,700, or $10,362 per mile. He allows but $63,500 for equipment.

National Junction.

This is the name of a railroad to be constructed in the District of Columbia, from a point on the Washington Branch of the Baltimore & Ohio Railroad outside of the city limits of Washington, around the northern portion of the city, crossing Rock Creek at Olive street, thence by tunnel to Prospect street, where a short tunnel will bring it to the piers of the aqueduct bridge, over which it will cross, and by means of the Berne Bank Railroad, now being constructed by the Alexandria Canal, Aqueduct & Bridge Company, connect with the Orange & Alexandria Railroad at their depot in Alexandria. This road will connect the Baltimore & Ohio with the railroads south of the Potomac. It will cost about $750,000.

Atlantic & Lake Erie.

Ground was broken for this railroad at Bucyrus, O., on the 22d inst. The road is to connect Toledo with the western terminus of the Chesapeake & Ohio Railroad.

Fort Wayne, Richmond & Cincinnati.

A telegram from Fort Wayne says that the directors of this company "have concluded arrangements with "prominent stockholders of the Pittsburgh, Fort "Wayne & Chicago Railway for the completion of their "road between Winchester and Fort Wayne, as fast as "money and the most vigilant efforts will do it. When "completed it will be run in connection with the Grand "Rapids & Indiana Railroad, by which Cincinnati and "the intervening country secures another route to "Michigan. It is expected the road will be completed "inside of six or eight months."

The length of the road to be completed is about 60 miles, which will be generally from 12 to 20 miles east of the Fort Wayne, Muncie & Cincinnati road. In connection with the Cincinnati & Richmond and the Grand Rapids & Indiana, it will form a very direct route from Cincinnati northward.

St. Louis & Keokuk.

The Troy *Herald* learns that Messrs. Wolf & Carpenter, contractors, have discontinued work and instituted suit against the company for the recovery of $80,000, which they claim is due them for work already done.

Louisiana & Missouri River.

From the Louisiana *Journal* we learn that the track, on the 20th, was laid as far as Bowling Green, about ten miles southwest of Lousiana. The grade for the ferry approach on the Missouri side of the Mississippi is nearly completed.

Midland Pacific.

This railroad, recently opened for business between Nebraska City and Lincoln, Neb., has the following stations. The figures attached give the distances in miles from Nebraska City:

Nebraska City	0	Bennet	41
Dennison	11	Cheney's Station	46
Syracuse	20	Prison Switch	54
Unadilla	27½	Lincoln	57
Palmyra	31		

This road has an outlet to Chicago through the Burlington & Missouri River road and its Red Oak Branch, and to Kansas City and St. Louis by the Kansas City, St. Joseph & Council Bluffs road.

The Nebraska City *News* says that arrangements have been made by which the Burlington & Missouri River road will take cars and passengers from the ferry at Nebraska City on the same terms as from Plattsmouth.

Jefferson City, Lebanon & Southwest.

The Jefferson City *Tribune* says that Mr. Harding, with a corps of engineers, has completed the preliminary survey of seven miles of this road, which it is proposed to build from Jefferson City, Mo., a little west of south, through Tuscumbia to Lebanon, on the Atlantic & Pacific road. So much of the road as is in Cole County, in which Jefferson City is situated, will be located, and bids for its construction be asked for at once.

Sioux City & St. Paul.

The Mankato (Minn.) *Unio* states that the grading on the St. Paul & Sioux City Railroad, beyond St. James, is progressing rapidly. Twelve miles are nearly completed. Fifteen miles will be fully completed the present month. The survey has been advanced beyond Lake Heron, nearly to the State line. The main points and distances, in Minnssota, have already been determined. The line crosses the Des Moines 25 miles from St. James; crosses the northern arm of Heron Lake 38 miles from St. James; strikes Lake Ochbeda, in Nobles County, 56 miles from St. James, and leaves the State near the east line of range 41, just 66 miles from St. James, or 100 miles from Mankato. The point of crossing the State line is about 30 miles west of Spirit Lake. Thence the road will run in a course west of south to a junction with the Dubuque & Sioux City road at Le Mars, on Floyd River. The track will be laid this season to Heron Lake, and possibly to some point between that and Lake Ochbeda, and the grading of the entire line to Le Mars will be finished this year.

Richmond, Fredericksburg & Potomac.

On the 8th inst. a called meeting of the stockholders of this company was held in Richmond, at which the officers submitted a report and resolutions, which were adopted. The report intimates confidence that the competing road, in the interest of the Pennsylvania Railroad, authorized by the last Virginia Legislature, will not be built. The resolutions authorize, first, the issue of convertible 8 per cent. coupon bonds to an amount not exceeding $150,000, payable in Richmond or Philadelphia; second, that a deed of trust be executed to secure the payment of bonds or certificates which have been or may be issued under previous resolutions, together with those now authorized; third, should further funds be needed, may obtain the same by bonds on convertible certificates, interest not to exceed 8 per cent., or guaranteed 7 per cent. stock, as shall be deemed advisable; fourth, and that to secure such further loan, together with all other guaranteed stock except that authorized May 27, 1857, a second lien by deed of trust may be created, provided that the aggregate thus secured shall not exceed $500,000.

Erie Railway.

Fifty-six regular trains are moved daily over the Erie, between Port Jervis and Jersey City, the labor on which costs $1,000 a day.

During the month of April, 9,414 tons of anthracite, and 1,125 tons of bituminous coal were used in the engines on the Eastern Division.

Over 4,000 more freight cars were moved over the road during April this year than in the same month in 1870, exclusive of coal.

Mast Hope, on the Delaware Division, the scene of the disaster in July, 1860, is now known as Pine Grove, appearing under that name on the new time-table.

Dubuque & Minnesota.

The Dubuque (Iowa) *Times* announces the purchase of 8,000 tons of iron for the Dubuque & Minnesota road. The iron was purchased for cash, the transaction involving an outlay of over $600,000. By the terms of the contract, 2,000 tons of iron are to be delivered monthly on and after the 1st of June next, the entire delivery to be made not later than November 10, 1870.

Municipal Aid in Minnesota.

A telegram from St. Paul, dated May 22, says:

"The recent decision of Judge Hall, of the Court of Common Pleas, of this county, declaring unconstitutional, illegal and void, all bonds issued as bonus to railroads, has thrown a bombshell into the camp of several railroad companies which are relying upon local aid for means to build their roads. Notwithstanding that the City Council, in special session, voted, by 8 to 3, to instruct the City Treasurer to pay the interest on the bonds now maturing, that officer still refuses to authorize the payment by the city's financial agent in New York, although the taxes have been collected and sent forward for the purpose. The Chamber of Commerce has appointed a committee to devise means for protecting the faith and credit of the city in the matter, but until the decision is reversed by a higher court it is difficult to see how it can be done. Great reliance is placed, by all who desire to see the city empowered to meet her obligations—which she desires to do—in the action of the Supreme Court in Iowa cases, overruling decisions somewhat similar to the present one."

Minneapolis & White Bear Lake.

Iron for this road, which is to connect Minneapolis with the Lake Superior & Mississippi Railroad, has arrived at Duluth, and track-laying is to commence next week. The road will be about 15 miles long.

Blue Ridge Railroad.

This railroad is to extend across the Blue Ridge from Northeastern South Carolina in the direction of Knoxville, Tenn., and will give a short route from Savannah and Charleston to the Northwest. Gen. J. W. Harrison, the President, writes of it:

"For the last two years a competent corps of engineers has been kept almost continually in the field, revising the location and estimates, resulting in shortening the distance between Anderson & Knoxville at least fifteen miles, with a proportionate saving of cost of construction. By a change of location in South Carolina, all the tunneling in that State has been avoided, with a cheaper and shorter line, leaving but one tunnel of any length on the whole line, viz., Dick Creek Tunnel, near Clayton.

"The policy of the company has been to confine the work to this tunnel, its completion requiring the longest time. That work is now so far advanced that it is no longer an obstacle as to time, but the whole road can now be made in eighteen to twenty months."

For want of means, the company has made slow progress. It has authority to issue $4,000,000 in bonds guaranteed by the State of South Carolina, but the low price of such securities has prevented the offering of them. When this road and others connected with it are completed, the distances from Chicago and Cincinnati to Charleston and Savannah will be about the same as to New York.

London, Huron & Bruce.

The promoters of this newly-projected Canadian railroad propose to construct a road with a 3 feet 6-inch gauge, from London (on the Great Western Railway, — miles from Detroit), nearly due northward across the county of Huron to some point on Lake Huron, in the county of Bruce. London will be asked for $100,000, the province of Ontario for $300,000, Huron County for $250,000, Bruce County for $150,000, and townships in Middlesex County for $25,000. Then $400,000 will remain to be raised by stock subscriptions and $100,000 by mortgages.

Springfield & Northwestern.

This road must not be confounded with the northwestern extension of the Springfield & Illinois Southeastern, which is completed from Springfield to Virginia, and will soon reach the Illinois River at Beardstown. The latter's route is about 30 degrees north of west from Springfield, while the Springfield & Northwestern's line is about 60 degrees north of west. The latter crosses the Jacksonville Division of the Chicago & Alton at Petersburg, and has its northwestern terminus on the Illinois River at Havana, and is about 40 miles long. The grading of that part of the line between Havana and Petersburg, 22 miles, is completed, and a large force is to be put on the line between Springfield and Petersburg.

The New Jersey Lease.

A meeting was held in Trenton on the 20th inst., of the proposed Joint Board of Directors of the United Companies of New Jersey. The lease to the Pennsylvania Railroad Company was approved and recommended to the stockholders for their adoption by a vote of 16 to 9. Two directors were absent. The following committee was appointed to present to the stockholders, and procure the signatures of those who ratify the decision of the Joint Board, in making the lease: Samuel Welch, R. F. Stockton, Jno. G. Stevens, A. L. Dennis, Cambridge Livingston and Ashbel Welch.

Marshall & Coldwater.

The subscriptions required for this road have been made, engineers are making the surveys, and it is reported that the contract for construction will soon be let. The road will extend from Marshall due south to Coldwater, about 24 miles.

Peoria & Rock Island.

The western division of this road was completed last week to Cambridge, the county seat of Henry County.

St. Louis & Illinois Southeastern.

Contracts have been let for clearing, grading and bridging of about thirty miles of road between McLeansboro and Equality. Between Equality and Shawneetown, about 15 miles, the road is in operation. The company advertise for 90,000 ties, to be delivered on the line within the next ninety days. The line from Evansville westward has been completed for eight miles, and a construction train is now running on it.

Detroit, Lansing & Lake Michigan.

Tracklaying is progressing on this road from Detroit northwestward and from Lansing southeastward. It is to be completed from Detroit to Plymouth, 18 miles, by the 1st of June, and there are several miles of track down at the Lansing end.

New York & Oswego Midland.

The New York *Bulletin* says this company has leased for ninety-nine years the Middletown, Unionville & Water Gap Railroad, now completed from Middletown, where it forms a junction with the Erie to Unionville, in Orange County. The Midland agrees to assume the entire floating debt of the Unionville road, and to pay seven per cent. interest, semi-annually, on its stock until July 1, 1872. The Midland will take possession of the road on the first of July next. By this transfer the former company secures an important link in its main line, fully constructed, and with a good local business. The Unionville road has been run by the Erie Company heretofore. Its charter authorizes its extension to the Delaware Water Gap.

Northern Colonization Railway.

The City of Montreal is discussing the propriety of granting $1,000,000 to this proposed railroad.

Grand Trunk.

There are now Pullman sleeping cars on the trains between Sarnia & Montreal, which connects at Montreal with similar cars for the Vermont Central and Boston, and for Portland. A line of Pullman cars also run through between Sarnia and Buffalo, so that passengers may be sure of good accommodations on this road.

Canada Pacific.

A telegram from Ottawa, Ont., says that Mr. Fleming, Engineer-in-Chief, expects to start several parties with supplies of different kinds of stores required on the Pacific survey shortly, to important points on the route. He expects to have 300 men on the explorations.

Chicago & Canada Southern.

A telegram from Indianapolis announces that articles of association of the Chicago & Canada Southern Railway Company were filed with the Secretary of State of Indiana on the 19th inst. The eastern terminus is in Richland Township, Steuben County; the western, in Worth Township, Lake County. The road is designed to run through the counties of DeKalb, LaGrange, Noble, Elkhart, Kosciusko, St. Joseph, Marshall, Laporte, Starke and Porter—length 144 miles. The capital stock is $1,500,000. The Directors are Chester Warren, Chicago; Fred. H. May, Chicago; Ransom Gardner, Kalamazoo; Milton Courtwright, Erie, Pa.; E. W. H. Ellis, Goshen; C. W. Calkins, Kalamazoo. The stock subscription is $52,600.

Delaware & Hudson Leased Lines.

The New York *Times* says: "The Delaware & Hudson Canal Company, on the 18th inst., concluded a perpetual lease of the Rensselaer & Saratoga Railroad from Albany and Troy to Lake Champlain and Rutland, Vt., including the old Schenectady & Saratoga Branch, from Schenectady to Ballston. The whole mileage of road,

without sidings and turnouts, is 181 miles, and the conditions of the lease are seven per cent. on the capital of $6,000,000 the first year, and eight per cent. thereafter, and the interest charges on the debt of $203,819 per annum. The arrangement affords the Delaware & Hudson a complete or continuous connection by rail from their mines *via* the Albany & Susquehanna road, already under lease, to Lake Champlain and the North.

"In regard to the Albany & Susquehanna Railroad, formerly leased to the Delaware & Hudson Canal Company, it will be remembered that a very fierce contest far the control of the railroad company was inaugurated some eighteen months ago between Mr. Fisk and Mr. Ramsey; that each party claimed to have elected their Board of Directors, and that various suits were thereupon commenced. The main suit was tried in the Special Term, and judgment given against the Fisk party. An appeal was taken, and the General Term have given a decision affirming the judgment, and directing that further prosecution of all suits be discontinued, the Ramsey directors to have immediate possession, and costs to be paid by the Fisk party."

Northern Pacific.

The first rail on the Western Division of this road was laid on the 19th inst. at Kalama, on the Columbia River, in Washington Territory.

Springfield & Cincinnati.

A telegram from Cincinnati dated the 19th says that contracts for building this road were awarded that day as follows: Cincinnati to Middletown—Earthwork, Grill, Denton & Co.; masonry, Bates & Bates. Middletown to Dayton—Earthwork, to M. B. Chamberly, of Hannibal, Mo.; masonry, to James Hamilton & Bros., of Piqua; track-laying, to Wm. B. Chamberlain. Steel rails will be used. The work will commence in fifteen days, and the track is to be ready for the rails by February 1, next, and for the cars the 1st of the following April. All the real estate for depots, etc., has been procured, at an expense of $384,500. The Plum Street Depot will be used jointly between the Indianapolis, Cincinnati & Lafayette, the Marietta & Cincinnati, and the new road.

Galveston, Houston & Henderson.

This railroad, which extends from Galveston northwestward 50¼ miles, to Houston, and connects the other railroads of Texas with Galveston, has been for many years in the courts. Holders of bonds brought suit in 1861 for foreclosure, and for some years the road has been operated by Mr. N. A. Cowdrey, of New York, the representative of the bondholders, as Receiver. These bondholders also brought suit for the earnings from 1860 to 1867, against the Junction Railroad Company, which was a short line 13¼ miles long connecting the Galveston road with the Houston & Texas Central, and against the Real & Personal Estate Association, which has the title to certain depot grounds, it being claimed that the property of the last two companies was procured with the earnings of the Galveston road. The suit was finally decided by the United States Supreme Court on the1st inst. The Galveston *News* states its effect as follows:

"The decision validates the bonds, and will, in effect, cause the road to be sold for the benefit of Cowdrey, James and others, or, in other words, give them the road; for, holding the bonds, no other party could afford to bid against them. But it is not a lien on the Junction road, nor on the Real & Personal Estate Association.

"The bonds under which Cowdrey claims were:

1st. Mortgage of 6 per cent. due them, including sterling exchange, say	$750,000
2d. Mortgage of 10 per cent., principal $750,000, due them, including interest, say	1,450,000
3d. Mortgage of 8 per cent., principal say, $2,000,000, with interest, say	3,500,000
Total	$5,700,000

"Now, in addition to these claims held by the bondholders and parties to this suit there are others:

1st. A fourth Mortgage to Robert Pulsford, on which there is due, say	$150,000
2d. The Houston, Tyler & Trinity Railroad Company have a mortgage which is a first lien on about two miles of the Houston end of the Galveston, Houston & Henderson Railroad, say	40,000
3d. At the commencement of the suit the city of Galveston owned the bridge, but this is now the personal property of Cowdrey and James, say	100,000
4th. The Real & Personal Estate Association own the depot and grounds at Galveston, which are said to have cost	40,000
Total	$330,000

"If we understand the decision, it gives to the plaintiffs the 52 miles of railroad with all its equipments, and a claim against the State of Texas for 512,000 acres of land subject to the Pulsford mortgage, the Houston, Tyler and Trinity mortgage and the ownership by the Real & Personal Estate Association of the Galveston depot and grounds."

ELECTIONS AND APPOINTMENTS.

—The stockholders of the Potomac Railroad Company (which proposes to construct a road from Washington to Acquia Cr eek) on the 6th inst. chose the following directors and officers: President, P. V. Daniel, Jr.; Secretary, J. B. Winston; Directors, Edgar Snowden, Jr., of Alexandria; Lieut. Gov. John S. Mayre, of Fredericksburg, and Major W. B. Myers, Ed. Cohen and James Alfred Jones, of Richmond. Messrs. Daniel and Winston hold the same offices in the Fredericksburg Company, and have their offices in Richmond.

—Mr. James Lamb, who has been foreman of shops for the past six years, has been appointed Master of Machinery of the Des Moines Valley Railroad Company, Mr. Morris Sellers, late Master Mechanic, having resigned to become agent of the Westinghouse Air Brake Company.

—The Board of Directors of the Michigan & Ohio Railroad Company have elected the following officers: President, W. S. Hickox; Vice-President, H. C. Lewis; Secretary, H. C. Hedges; Assistant Secretary, John S. Youngs; Treasurer, D. B. Dennis; Assistant Treasurer, H. H. Sturgis; Chief Engineer, Gen. N. Gleason.

—Mr. G. W. Wood, formerly a member of a firm of druggists in Chicago, has been appointed Assistant Superintendent of the United States railroad postal service, having charge of the service west of Buffalo. He succeeds Mr. George S. Bangs, who has been promoted to the general superintendency of the service.

—Mr. A. H. Reese has been appointed General Superintendent of the Detroit, Lansing & Lake Michigan Railroad. Mr. R. Laughlin has been appointed Assistant Superintendent of the same road.

—The directors of the Keokuk, Iowa City & Minnesota Railroad Company, elected on the 17th, are Messrs. Guy Wells, R. L. Ruddick, C. Snider, J. H. Wilson, G. J. Boal, C. W. McCune, D. Campbell, M. C. Parker and Adam Perry. Mr. G. J. Boal, of Iowa City, was elected President; Guy Wells, of Keokuk, Vice-President; W. H. Shipman, of Iowa City, Treasurer; Charles H. Wilson, of Washington, Secretary.

—The following directors of the Lake Pepin & Omaha Railroad Company were elected on the 9th: Solomon Snow and N. P. Austin, of Austin; T. H. Armstrong, of High Forest; H. T. Horton, T. H. Titus, G. W. Van Dusen and O. P. Whitcomb, of Rochester; O. Willcox, H. P. Wilson and A. R. Felton, of Plainview; J. B. Downer and Lucas Kuhn, of Wabashaw. At a meeting of the directors, the following officers were elected for the ensuing year: H. T. Horton, President; O. Wilcox, Vice-President; T. H. Titus, Secretary; O. P. Whitcomb, Treasurer.

—At a recent meeting of the St. Paul & Sioux City Railroad Company held in St. Paul, the following were chosen directors for the ensuing year: E. F. Drake, J. L. Merriam, J. C. Burbank, T. A. Harrison, Horace Thompson, G. A. Hamilton, Samuel F. Hersey, J. W. Pence, A. H. Wilder, W. F. Davidson, G. H. Bigelow, John S. Prince, Russell Blakeley, H. H. Sibley and H. G. Harrison.

—Mr. H. M. Britton, late Master Mechanic of the Indianapolis, Cincinnati & Lafayette Railroad, has been appointed Superintendent of the Whitewater Valley Division of that railroad.

—The stockholders of the Texas Pacific Railroad Company met in New York on the 23d inst., at the office of Marshall O. Roberts, and had an election for directors, with the following result: Moses Taylor, Marshall O. Roberts, Thomas A. Scott, Samuel J. Tilden, Edward Pierrepont, Henry G. Stebbins, George W. Cass, W. T. Walters, Henry D. Newcomb, E. W. Rice, Henry S. McComb, John W. Forney, John McManus, John S. Harris, William R. Travers, George W. Quintland and J. W. Throckmorton. At a meeting of the directors subsequently, the following officers were elected: President, Marshall O. Roberts; Vice-President, Henry G. Stebbins; Treasurer, Edward Pierrepont; Secretary, E. B. Hart; Executive Committee, Thomas A. Scott, Edward Pierrepont, Henry J. Stebbinr, W. B. Travers, G. W. Cass and W. T. Walters.

MECHANICS AND ENGINEERING.

"First Class" Street Cars.

The New York *Herald* describes as follows the new "drawing-room" cars which have lately been put upon the Third Avenue Street Railroad in that city: "These magnificent vehicles are elegantly fitted up inside. There are stationary and movable seats, elegantly upholstered; a speaking trumpet, by means of which the conductor communicates with the driver; a bell, brake, and all the other necessities of street cars. These cars, unlike the old ones, are lighted from the roof by tastefully arranged silver lamps, and will hold twenty-nine passengers. The fare is to be the same as on the other cars—five cents, but an extra charge of ten cents will be made for seats, and no one will be permitted to ride who has not secured a seat. Four horses are to be attached to each car, and they will make the entire trip to Harlem, turning round the gridiron in City Hall place to avoid the necessity of shifting the horses from one end to the other. There is no platform in the rear; the door, when closed, shuts in the steps, so that there is no possibility of the passengers being annoyed by hangers on. The car was inspected by a large number of people yesterday. The only objection that seemed to prevail against the style of the new conveyance was its height from the street, which made it look ungainly as it passed along."

Narrow Gauge in Philadelphia.

The New York *Sun* says: "Several narrow-gauge railroads are projected in Pennsylvania. A company has been chartered to build a road of thirty-inch gauge from Philadelphia, to connect with the Pennsylvania Central in Chester County, passing through Upper Darby, Hereford, Maple, Newtown and Paoli. In a week or two work will be begun on another narrow-gauge road from Bell's Mills Station, on the Pennsylvania Central, in Blair County, across the Allegheny Mountains, through Bell's Gap, a distance of twelve miles, which will afford an outlet for the coal, lumber and iron of an important mountain district. Some of the gradients on this line will be over one hundred feet to the mile. The Lancaster & Reading Narrow-gauge Railroad Company has been incorporated, with the right to build a road with a gauge not exceeding four feet, from the city of Lancaster to the city of Reading; also to construct branches. There is also a movement on foot to build a narrow-gauge road from Media to Chester, in Delaware County."

The Keokuk Bridge.

The formal test of this new bridge over the Mississippi was made on the 18th inst. by bringing five locomotives of the Des Moines Valley Railroad to a halt on each span and running them all together over the bridge. The bridge bore the tests satisfactorily.

Elastic Car Wheels.

A correspondent writes to us from San Francisco as follows:

Dr. J. N. Farrar, of California, is preparing a digest of all the elastic wheels invented since 1790. He has given the subject much attention for the past three years, and has been very thorough in his investigations at the patent office, as well as elsewhere, and probably no person living is so well posted on this subject. In summing up, he says: "All of the numerous inven-"tions may be classed under three general divisions or "grooves, in which inventors of elastic wheels have "invariably run, and all have resulted in one of three "difficulties, which, thus far, seem to prevent their "general usefulness." From a careful examination of these numerous failures and partial successes he has, with a view to usefulness, made several improvements, by which he believes several of the now useless inventions may easily and cheaply become a success, and believes the time is near at hand when the long-looked-for wheel will be adopted as a point of economy.

Dr. Farrar is a gentleman possessing human feelings and willing to "live and let live," and bitterly opposed to the heartless extortions too common among inventors, and says if he is successful he is determined to show railroad men that there is one inventor who works for their interest, believing mutual liberal protection is the best policy. May he live to illustrate his generosity.

Our correspondent fails to give the only information that is important. Our readers will hardly care to be told that Doctor Farrar has discovered the fundamental error in elastic wheels hitherto invented, or that he has invented something better, unless at the same time they are told what those fundamental errors are and how they are to be prevented.

British Rail Exports in April.

Messrs. Heyerdahl, Schoenberg & Co., of No. 31 Pine street, New York, furnish the following monthly report of exports of railroad iron from Great Britain, extracted from government returns:

	Month ending April 30.			*Four months ending April 30.*		
	1869. *Tons.*	1870. *Tons.*	1871. *Tons.*	1869. *Tons.*	1870. *Tons.*	1871. *Tons.*
United States	38,565	37,016	32,456	116,077	117,803	135,421
Russia	21,166	20,619	5,732	29,494	94,725	14,732
Austrian Territories	1,894	2,386	93	11,100	13,563	609
British India	6,517	15,986	7,389	18,405	73,681	21,672
British North America	4,756	5,371	5,929	8,393	8,701	8,636
Egypt	309	189	46	2,166	1,521	446
Australia	1,485	900	3,337	7,102	4,417	7,917
Brazil	....	295	1,231	539	1,933	6,227
Holland	943	3,241	1,497	3,396	7,735	1,688
Spain and Canaries	2,724	1,115	842	4,391	8,328	3,413
Sweden	2,880	....	1,903	5,2 0	....	1,213
Chili	....	362	....	1,658	5,734	99
Spanish West India Isl'ds	....	1,089	66	319	1,614	533
Peru	1,290	....	....	8,420	2,932	5,577
France	1,188	10	1,099	2,285	146	1,930
Germany	393	5,003	10,178	1,756	14,299	20,164
Other countries	6,037	3,294	6,585	15,162	20,420	21,985
Total	85,147	96,876	77,663	233,353	306,027	252,142
Total exports from Great Britain of iron and steel to all countries	252,335	270,079	284,190	748,785	844,794	775,557

The Leavenworth Bridge.

The first pier was completed on the 15th, and piers 2 and 3 are nearly finished. It is expected that the entire substructure will be completed by the 10th of June.

Narrow Gauge in California.

This railroad is to extend from Marysville, Cal., eastward through Nevada City to Grass Valley, on the Central Pacific, and will be about 45 miles long. Mr. R. L. Harris, one of the best railroad engineers of California, estimates for three lines—of 4 foot 8½-inch gauge, of a superior 3-foot, and of an inferior 3-foot gauge. The length of the broad-gauge road is 52.1 miles; of the superior 3-feet, 52.1 miles; and of the inferior 3-feet, 57.2 miles. The estimates were for 50 and 45-lb rails for the broad-gauge, on 50 and 45-lb rails for the superior narrow-gauge, and on 40-lb rails for the inferior narrow-gauge.

The total costs of the road-beds are given as $476,418, $421,363 and $246,788 for the three lines. The latter and longer route having, presumably, much lighter grades. The total cost of this light line was estimated at $11,126 per mile.

New Safety Valve.

A correspondent writes as follows to the *American Railway Times:*

"I recently saw an ingenious safety valve arrangement in the hands of Mr. E. G. Bellows, of Worcester. The valve requires neither spring nor lever, and no weight except its own for its operation. The valve, some three inches in diameter, and one and a quarter thick, is enclosed in a case, in which it works up and down easily yet snugly; it has a range of three-eighths to half an inch—its diameter and range must vary, of course, according to the capacity of the boiler; the lower face is flat, and its upper face slightly concave, and it has a small hole through its center. The bottom of the cup or case upon which it rests has a central hole for the escape of steam from the boiler; around this central hole, and concentric with it, are several segmental holes, through which the steam passes to the atmosphere. The valve covers all of these holes with a steam tight fit.

"The reader will now perceive that if there were no other opening into the valve-case than the central and segmental ones just named, there could be no action to the valve, for the steam from the boiler would pass through the small hole in the valve into the space above it, and of course, would press the valve upon its seat with a force in proportion to the aggregate area of the segmental holes. To relieve the valve of this pressure, a small auxiliary valve is fitted in the cover of the case, of perhaps one-fourth of a superficial inch area, which

is adjustable to any pressure required. When this valve opens the larger valve is relieved of its top pressure, and rises at once and relieves the boiler."

The Highland Suspension Bridge.

It is expected that the work of constructing the Highland Suspension Bridge between Fort Clinton and Anthony's Nose will be commenced some time this summer. Its location was selected by a board of eminent engineers, among whom were Horatio Allen, Gen. Geo. B. McClellan, Gen. Q. A. Gilmore, Gen. Edward W. Serrell, Hon. Wm. J. McAlpine, Gen. Charles B. Stewart, Gen. Henry Benham, Gen. Horatio B. Wright, Col. Julius W. Adams, and Mr. O. W. Barnes.

The clear span of the bridge will be 1,600 feet; from center to center of the towers, 1,665 feet. Total length of the bride, including approaches, 2,449 feet; height of bridge above high water, 152½ feet; height of grade line, 177 feet; safe working load for the railroad lines, 2,400 tons; safe working load for highways, 2,880 tons; total safe load for bridge, 5,280 tons; load that would break the bridge, 25,171 tons. There are to be 20 cables in four systems. Each cable will be about 14 inches in diameter. They will contain 371,195,750 feet, or about 70,302 miles, of steel wire. The total weight of iron and steel in the bridge will be 17,005 tons. The cables will be supported on two granite towers 297 feet high. The original design would have required about 58,000 cubic yards of masonry, but the plans have since been changed so as to reduce materially this quantity.

The bridge will have two decks or floors, the upper for the railroad, the lower for the highway. The elevation above the water level will be above the tallest masts of vessels.

Narrow-Gauge in Missouri.

The St. Louis *Republican* says: "From Messrs. B. W. Alexander & Sons, proprietors of the Hermitage Iron Mines, we learn that they have just finished a narrow-gauge road, which presents many interesting features. Their mine is situated in Crawford County, Mo., four miles west of Cuba, a station on the Atlantic & Pacific Railroad. The road they have constructed is a three-foot gauge, and two miles in length. The cars to be used on this road are made entirely of iron; each weighs 1,500 pounds, and is capable of carrying three tons of iron ore. The cars are so constructed as to dump underneath into the cars of the Atlantic & Pacific road. The locomotive to be used on this road enjoys the two-fold honor of being the first light locomotive run in the State, and of being of home manufacture. It is a tank engine, and was designed and built under the supervision of Mr. A. C. Robertson, of the St. Louis Iron and Machine Works. This engine weighs about six tons on the road, and is expected to draw 100 tons on a level, and 30 to 40 tons on ordinary grades. It has two 7x12-inch cylinders, an 8 foot 8-inch boiler, and 62 2-inch tubes. The tank will hold 156 gallons of water. The engine is also provided with the link motion, and is furnished with a substantial and handsome cab."

Blood's Reclining Seats.

Two new and very elegant cars fitted with these seats, which are adjustable to half-a-dozen different positions, have recently been completed at the works of Jackson & Sharp, in Wilmington, Del., for the St. Louis & Iron Mountain Railroad. They are now running in the day train between St. Louis and Columbus.

Rail and Wheel Brake.

A peculiar brake, which has been fitted to a car on the Philadelphia & Erie Railroad, is described as being so constructed that when the brake shoe is applied to the wheel the friction applies another shoe to the rail. In this way, it is claimed, a train can be stopped in half the time necessary where wheel brakes alone are used.

Dimensions of the Erie Canal and its Boats.

For the benefit of inventors, the *American Artisan* gives the following dimensions of the Erie Canal and of boats running on it:

"The width of the canal is seventy feet, the least depth of water seven feet, and the length of the locks one hundred feet. The average dimensions of the boats are: length, about ninety-six feet: breadth, seventeen feet three inches; depth of hold, nine feet; their custom-house measurement averages one hundred and twenty tons, but they carry an average of about two hundred and thirty tons; their average draught is, when light, two feet, and when loaded to full capacity, six feet, leaving, in the latter case, one foot of depth below them where the water is shallowest. The speed at which the boats are required to be propelled by steam is not less than three miles an hour."

The St. Peter Bridge.

The following description is given of the new bridge recently completed over the Minnesota River, at St. Peter, for the Winona & St. Peter Railroad:

	Feet.
Length of draw-bridge	260
Three spans of Howe truss, each 150 feet	450
Two spans of Howe truss, each 125 feet	250
Trestle bridge	1,540
Total length of bridge	2,500

The structure rests on 3,000 piles, and, besides these, 100 more have been driven for the protection of the banks.

It required 1,000,000 feet of the choicest pine lumber for the trestle-work and cribbing, aside from that used on the 1,000 lineal feet of truss work.

The height of the bridge from the river bed is 63 feet, and the average height from low water is 48 feet.

Railroad Construction in Louisiana.

We learn from a contractor who has recently finished an important work in Louisiana, that the cost of construction there is considerably greater than in the North. Laborers are almost always brought from the North, negroes being very poor hands for such work, and the forces imported do not usually work as well as at the North, where there is a larger supply. The cost of all supplies, tools, machinery, etc., is greater, and even the material grown on the spot costs more than similar material in the Northwest. For instance, in Lousiana the timbers for bridge and trestle work, ties, etc., are usually obtained in the woods, the contractor purchasing the standing trees near the place where they are to be used from the owner of the land, and cutting, preparing and transporting them himself; yet, even then, the timbers cost him more than they would in the yards at Chicago. Cypress is the timber chiefly used in Lousiana, and is a very durable timber. In the western part of the State there are great forests of the long-leaved pine, the chief tree of the South coast for a hundred miles or more from the coast, and this is good both for ties and for timbers, the pitch with which it is saturated making it quite durable.

TRAFFIC AND EARNINGS.

—The receipts of the Great Western Railway of Canada for the week ending April 28, 1871 were:

Passengers	$25,444 08
Freight and live stock	58,583 02
Mails and sundries	2,395 15
Total receipts for week	$86,422 25
Corresponding week, 1870	85,179 70
Increase	$1,342 55

—The traffic receipts of the Grand Trunk of Canada, for the week ending April 29, amounted to £30,900, against £30,800 in the corresponding week of last year, showing an increase of £100.

REGISTER OF EARNINGS.

FOR THE SECOND WEEK IN MAY.

Michigan Central (284 miles), 1871	$90,279 56
" " (284 miles), 1870	83,764 56
Increase (8 per cent.)	$6,515 00
Chicago & Alton (511 miles), 1871	$116,103 77
" " (466 miles), 1870	92,891 41
Increase (25 per cent.)	$23,242 36

RAILROAD LAW.

***Express Companies.**—The original company is not liable for loss occasioned by the fault of another company on a connected line.*

In the United States Circuit Court for the Southern District of Alabama in the case of *St. Johns vs. The Southern Express Company*, the principle has again been declared that express companies are not to be held liable beyond the letter of their specific contracts. The facts are these:

"Plaintiff, a merchant in Mobile, forwarded by the Southern Express Company, on the 26th day of May, 1866, the sum of $5,000 to be delivered to one J. B. Alexander, a resident of New York city. For this he paid the ordinary charge of twenty-five cents for letters in stamped government envelopes, thus leading the employes of the Southern Express Company into the belief that it was but an ordinary business letter, having no declared value. The letter was carried by the Southern Express Company to Lynchburg, Virginia, and was there transferred to the custody and care of the Adams Express Company, to be by it delivered to the person addressed in New York. The delivery clerk of this latter company opened it and filched the $5,000 which he found in bills of large denomination. Complaint reached the Adams Company of the non-delivery of the letter for Alexander, they set inquiries on foot and ascertaining the delinquency of their clerk had him arrested and secured the greater part of the stolen funds. A failure to deliver the package to Alexander was considered good grounds for suit by St. John, who came upon the Southern Express Company. Judge Wood delivered the decision of the Court, at great length, during which he laid particular stress upon a provision in the Southern Express Company's receipts for money packages, which says, "that this company is to forward the same to its agent nearest or most convenient to destination only, and then to deliver the same to other parties, they to complete the transportation; *such delivery to terminate all liability of this company for such packages.*"

Estoppel as to Different Railroad Companies Concerning the Taking of Land.

In the recent case of the *Erie Railway vs. Delaware, Lackawanna & Western Railroad Company* (6, C. E. Green), the following principles were stated:

"If two railroad companies have the authority to build and run a railroad between the same termini, neither can take exception to any irregularity or unlawfulness in the exercise of such franchise by the other, unless it can show a particular injury to itself from such course.

"When a party stands by and encourages another in the construction of a public work, at great cost, this court will not interfere with it at his instance. Such conduct estops him from calling in question the legality of the structure.

"Where a railroad appropriated land under a belief that they were the owners of it, and the land appeared to be of no particular value to real owners, this court, in exercise of its discretion, would refuse to restrain the company from its enjoyment.

"*Quære.*—Whether this court will prevent by injunction the permanent appropriation of lands by a railroad company, acting *ultra vires*, in the absence of irreparable injury.

Where a company have irregularly taken lands, but have the capacity to acquire title, this court will not, where the advantage to the complainant would be small, and the injury to the company incalculably great, interpose and stop the running of the cars on such road, until the statutory method of acquiring title can be executed.

When the title to the lands, the use of which the complainant seeks to enjoin is in dispute, this court has no jurisdiction. In such case an injunction is never granted to prevent the enjoyment of the property in dispute by either party who happens to be in possession of it.

A court of equity will never lend its active aid to a party who, by a superior knowledge and artful silence, has gained an unfair advantage over another."

***Responsibility for Loss of Baggage.**—Railroads must carry the baggage of passengers—Where the line of transit is over the roads of different companies, each company is liable for the loss of baggage—Rule as to purchase of tickets*

In the as yet unreported decision of the *Chicago & Rock Island Railroad Company vs. Fahey*, the following decision has been arrived at by the Supreme Court of Illinois:

"The price paid for a passenger ticket upon a railroad includes the carrying of his baggage, and the recognition by the road over which the passenger is entitled to travel of the validity of the ticket, is an admission that the check given for the baggage is equally binding.

"Where a passenger ticket entitles the holder to travel over different lines of road to his place of destination, and to which his baggage is checked, all of them recognizing the validity of the ticket when presented by the passenger, each company to whose possession the baggage may come will be liable to the owner for its loss while in the possession of such company.

"Where a passenger seeks to hold one of several roads in his line of transit liable for the loss of his baggage, the recognition of his ticket purchased at the beginning of his trip by the conductor of such road is, in effect, an admission that it was issued by some person having competent authority to bind the company, and in such case it is immaterial whether the ticket was issued by a special agent of the company sought to be held liable, or by the ticket agent of some other company."

Camden & Atlantic Railroad Report.

The Camden & Atlantic Railroad extends from Camden, N. J., (opposite Philadelphia) southeastward across Southern New Jersey to Atlantic City, a distance of 60¼ miles. A large part of its business is conveying passengers to the watering place, and the country on its line affords little traffic.

The receipts from operations of this road for the year ending Dec. 31, 1870, were:

From passengers	$222,069 04
From freight	92,094 23
From express	15,750 90
From United States mail	3,000 00
From miscellaneous	1,529 96
Total	$334,444 23
Working expenses	175,078 21
Balance	$159,366 02

In the report of the Superintendent the receipts are stated at $334,444.23 for the year 1870, against $321,438.44 in the year 1869—an increase of $13,005.79, and the total expenses in 1870 at $175,215 23, against $221,276.04 in 1869—a decrease of $46,060.81. The percentage of receipts expended in operating in 1870 was 51.14 against 61 in 1869, a decrease of 9.96. The President in his report says: The earnings and expenses of operating the road, excluding renewals, from the year 1865 to 1870, inclusive, together with the percentage of receipts thus expended, are given in the following table:—

	Earnings.	*Expenses.*	*Profit.*	*Per cts.*
1865	$266,848 32	$178,850 01	$88,488 31	66.83
1866	288,649 95	149,394 54	139,255 51	51.75
1867	316,972 03	149,926 73	167,045 30	48.85
1868	325,040 84	174,945 74	150,095 10	53.82
1869	320,677 65	174,620 02	146,057 63	54 45
1870	333,514 87	167,083 29	166,431 57	50.09

The Company have 8 engines, 19 first-class and 15 second-class passenger, 4 baggage, 2 mail and 89 freight cars. Miles run by engines with passenger trains, 120,760; freight, 32,509; gravel, wood, construction and switching, 10,367—163,636, against 160,166 in 1869, an increase of 3,470.

BALANCE SHEET.

Capital stock—common	$377,100 00
Capital stock—preferred	752,700 00
Fractional scrip	995 59
First mortgage bonds	490,000 00
Second mortgage bonds	500,000 00
Third mortgage bonds	100 00
Bonds and mortgages	75,079 60
Second mortgage coupon scrip	1,423 40
Bills payable	58,207 14
Due for materials, etc.	15,761 35
Wages due hands for December	3,927 59
Balance of income	159,366 02
Total	$2,443,660 69
Cost of road	$1,762,831 98
Equipment	328,543 14
Profit and loss	122,221 25
Interest on bonded debt	69,272 00
Total (including miscellaneous items not above enumerated)	$2,443,660 69

—A telegram from Detroit dated the 12th inst. says: "The bonds of this city, to the amount of $300,000, which were voted to the Detroit & Howell Railroad, and were deposited with the State Treasurer, but which were made void by the Supreme Court decision overturning all municipal-aid laws, have been delivered up by the Treasurer to Comptroller Garfield, with the consent of the railroad company, and under judicial proceedings, and will be destroyed. The question of what shall be done with the bonds now in the hands of the State Treasurer, has aroused much interest, and this step is important."

—The Board of Trade of Rochester, Minn., will, it is reported, prosecute the Winona & St. Peter Railroad Company for violating the law of Minnesota limiting freight charges. The law makes it the duty of the Attorney General to conduct the prosecution when a case is made out under the law.

Description of the Grant Locomotive.

The following description of a locomotive is taken from a volume published by the Grant Locomotive Works, as an excellent specimen of the detailed manner in which specifications should be made:

BOILERS.

The outside shell of the boiler is made with either a straight or wagon-top, as desired. Each course of the barrel of boiler is formed of a single sheet. The side sheets of outside shell of fire-box join the crown sheet of shell 1½ inches above the crown of fire-box.

Extra plates of iron are riveted to the inside of the side sheets, where the expansion braces are attached, to give double thickness of metal for the studs. All the horizontal seams in the shell of boiler, and the seam which joins the barrel of the boiler to the fire-box shell, are double riveted. All sheets ⅜ inch thick are riveted with ¾ inch rivets, spaced two inches from center to center; 5-16 and ¼ inch sheets have ⅝ inch rivets spaced 1⅞ inches.

FIRE-BOX

at the bottom is as wide as possible, allowing sufficient water space, but is swelled out after passing the frames.

The flue and back sheets have flanges two and one-half inches wide turned on the sides and top; the crown sheet has flanges on the sides; the side sheets have no flanges. The space between inside and outside sheets at the bottom of fire-box is filled by a solid wrought-iron ring, two inches thick, and riveted to both sheets by long rivets.

The stay bolts are made of Low-Moor iron ⅞ inch diameter, tapped through both sheets and riveted on both ends. They are spaced as near four inches from center to center as practicable. All fire-boxes are made of homogeneous steel plates unless otherwise ordered.

The fire-box door is made by flanging the back sheet of fire-box into the water space, and riveting a flanged sheet on outside of shell; the two flanges are connected by a welded ring of plate iron. The door is of cast iron and has an inside lining of cast iron perforated to admit air, the supply of which is regulated by a register on the outside.

CROWN BARS, BRACES, ETC.

The crown sheets are supported by bars formed of two pieces 4x¾ inches welded at ends. They are placed across, and ¾ inch above the crown sheet, each end having a lip turned down and resting on the edge of the side sheets. The bars are placed 5 inches from center to center, and are fastened to the crown sheet by T head bolts riveted on the under side of crown sheet. Each crown bar is connected to the outside shell by two braces bolted to crow feet.

The domes are also braced to the crown bars, by four braces. The back end and front tube sheet are braced by longitudinal braces. In wagon-top boilers the sides of throat are braced by angle irons riveted to them and connected by suitable braces.

SMOKE-BOXES

are circular, and have a solid wrought iron ring riveted to the front end to receive a cast iron front. The smoke-box door is circular, hinged on the side and fastened by four hook bolts held in position by lock nuts.

TUBES

are put in vertical rows. The two middle rows are arranged so that the tubes in them come opposite to each other. Iron tubes are set with copper ferrules at the fire-box end.

MUD HOLES.

An elliptically shaped mud hole, 2½x3¾ inches, is placed on each outside corner of the fire-box near the bottom ring. Each hole is covered with two cast iron plates, one inside and the other outside the boiler, and fastened with a bolt which passes through both.

BLOW-OFF COCKS.

A brass blow-off cock is placed in the back leg of the boiler, underneath the foot board, and arranged so it can be opened from the cab.

LAGGING.

The boilers are lagged with ⅜ inch pine, and sheathed with Russia iron. The latter is held on with brass bands, drawn tight with bolts and nuts. The domes are also lagged with ⅜ inch pine, covered with Russia iron. Each dome has a cast iron base, and an ornamental molding made of sheet iron or brass at the top and bottom.

FRAMES.

The frames and jaws are forged solid, of hammered scrap. The jaws, top of pedestal and feet in the jaws, are all forged out of one shape, which is bent so as to form each part. The top bar of the frame is then welded on at the point where the jaw and pedestal unite, and the bottom braces are welded to the feet.

Both sides of the frames are planed to a gauge, so as to make the thickness the same through their whole length. The jaws are all made tapered to receive the wedges. The form of the jaws, etc., is laid off from a template. Each pair of frames are bolted together and finished on a slotting machine, to the form and size of the template. The distance from the back face of the cylinder pocket to the center of the main driving-box is accurately gauged by a steel rod. All the holes are drilled from a cast iron gauge or template which is bolted to the frame.

A brace extends across the mouth of the jaws, from one foot to the other, and is held by a lug on each foot, which is let into a corresponding slot in the brace. The lugs and the slots to receive them, are both planed to gauges which fit to each other. The braces are bolted to the feet, and each bolt is secured with lock nuts.

The frames of all engines which have a four-wheeled truck are spliced in front of the front driving-wheel. For this purpose the frame is made with two braces, one welded to the top bar, andthe other to the foot of the front jaw, and inclined towards each other, and left open to receive the front bar. The braces are bolted to the bar with bolts which pass through all three. The front bar has a ⊢ shaped lug on the end, which is bolted to the front jaw. The frames of engines without four-wheeled trucks are made solid, *i. e.*, the front bar is welded to the back end of frame.

A recess or pocket is made in the front ends of the frames to receive the cylinders, which are keyed in with a key driven in in front of the cylinder.

WEDGES.

The forward jaw of each pedestal has a cast iron dead wedge fitted snugly between the top of pedestal and bottom brace. This wedge is bolted securely to the jaw with two bolts. The back jaw of each pedestal has a cast iron movable wedge, which can be adjusted by a bolt tapped into the bottom brace, and secured with a lock nut underneath. The wedge is held in position by a movable bolt, which passes through a slot in the jaw. The faces of each pair of wedges are laid off on the frame by a gauge, so as to be square with the top of the frame and parallel with each other.

EXPANSION BRACES.

A wrought-iron expansion plate of an L shaped section is bolted on each side of the fire-box. The bottom flange of this plate rests upon the frame. On top of the flange of the expansion plate is another wrought iron plate, with a lug at each end, which rests on the frame and is bolted to it. The latter plate has round holes, and the expansion plate has oblong holes to receive the expansion bolts which pass through the frame. Each bolt has a washer on it of the same thickness as the flange, and received by the oblong holes. The top plate is then bolted down hard on these washers, and is stationary on the frame, while the expansion plate moves with the boiler. When a pair of drivers is behind the fire-box, a wrought iron clamp is bolted outside both the expansion plate and the frame. This clamp holds the fulcrum for the equalizing lever, and runs down with a foot and a bracket. The foot is bolted to the fire-box, while the bracket rests on the bottom bar of the frame, and has oblong holes the same as the expansion plate, with washers, and a top plate bolted down hard on the washers. The top bar of frame is fastened to the fire-box by additional wrought iron clamps, and the bottom bar by wrought iron brackets where they are necessary.

FRAME BRACES.

A tail brace made of hammered iron extends across, and is let into the back end of each frame. It has a Ω shaped piece forged on it, to which the draw casting is bolted. All engines, with the exception of some anthracite coal burners, with long fire boxes, have two braces made of rounded rolled iron bolted to the tail braces next the frames, and extend upward at an angle of about forty-five degrees to the shell of the fire box, to which they are bolted with a suitable foot.

A wrought iron cross brace is bolted to each frame in front of the main driving axle. An angle iron, made of boiler plate, is bolted to this brace, and riveted to the boiler. The angle iron has a projection or lug to hold the counterbalance spring.

The frames which are spliced have a brace, the foot of which is held by two of the splice bolts, and the other end is riveted to the shell of the boiler.

The front ends of the frames are braced to the smoke-box by a brace made of round rolled iron, and bolted to the top of the bumper timber and the frames by a foot with a lip, which locks against a corresponding lug on the frame. The foot has two bolts which pass through the timber and frame. The upper ends of the braces are bolted to the smoke-box by a suitable foot.

DRIVING SPRINGS

are made of cast steel. Each plate is punched in the center so as to make a cavity on one side and a projection on the other, which prevents the plates from slipping. A band is then shrunk on the center of the spring The spring hangers are made of hammered iron. The ends which are attached to the frame are hung on rubber seats. The saddles for driving springs are made of cast iron, and rest in sockets cast for the purpose in the driving boxes.

EQUALIZING LEVERS.

All engines, with the exception of those with only four wheels, have suitable equalizing levers between the driving springs.

CYLINDERS

are all horizontal, cast of Lake Superior charcoal iron: one-half the saddle, the steam and exhaust pipes are cast on each cylinder. Both cylinders are alike, and are bolted together at the center of the engine. The smoke-box is round, the cylinders are fitted and securely bolted to it. The cylinders are bored, and the flanges turned and faced to gauges, then planed parallel with the bore, and the face of one where they join each other, drilled through a template. They are placed together, leveled by the frame seat, and the second cylinder marked off and drilled, then clamped together and the holes reamed, and the cylinders bolted together. The center casting for the truck and its seat are planed and drilled through a template and bolted in position.

The ports in the valve seat are milled to size by a cutter from a gauge which is bolted on the valve seat. The cutter works in a block which slides in slots in the gauge, corresponding to the ports. All the holes for steam-chest studs, cylinder-head, and frame bolt are drilled through templates. The templates are made of cast iron, and have the holes in them bushed with hardened steel.

CYLINDER-HEADS

are the same diameter as the flanges of the cylinders, and are fitted thereto with scraped joints. The front heads have a grooved turned in them next to the counter-bore, to protect the cylinders in case of accident. The flanges of the stuffing-boxes on the back heads are circular to receive the castings. Both the stuffing-box and gland have brass bushings fitted to the piston rods. The gland studs are case-hardened and provided with lock nuts.

STEAM-CHESTS

are made with pockets on the inside for the bolts, the covers have ribs both on the inside and the outside to stiffen them. The joints between the chest cover and cylinder are made with copper gaskets.

All the holes in the chest and covers are drilled through the same template that is used for the cylinder.

VALVES

are of cast iron, and have their faces scraped to the valve seat. The stem is attached to the valve by a yoke which embraces the valve. The stem is connected to the valve rod by a socket joint.

PISTONS.

The heads and followers are made of cast iron, are turned to gauges, and fitted with brass packing rings. The piston rods are made of cast steel and are fitted taper into the pistons and cross-heads and keyed to them.

GUIDES

are made of cast steel, four to each cross-head, and are placed central on the cylinder head. Each pair of guides is bolted at each end to a block, one of which is fastened to the cylinder-head and the other to the guide yoke by a stud and nut. The guide blocks are faced off in a special chuck (which receives a full set) to an exact thickness. The guides and blocks are bolted together and planed and finished to a gauge.

The holes in cylinder head and guide yoke which receive the slide block studs, are drilled through a template.

GUIDE YOKES

are made of plate iron, planed and finished to a template. They are bolted to the frames by a lug and to the rocker box. They are fastened to the boiler by an angle iron, and form a bracket for the running board.

CROSS-HEADS

are made of hard cast iron, and are all fitted with glass bearings to prevent wear.

The neck of cross-head is first bored taper to fit the piston rod, the cross-head is then placed on a mandril with a gauge attached to it and planed. The journal for the connecting rod is cast in the cross-head, as is also the lug for driving the pump.

ROCKERS

are made of wrought iron, forged solid, and are finished all over, to gauges. Each arm has a boss on the end, and is furnished with case-hardened taper pins for valve rod, and link.

The rocker boxes are made in two pieces, bolted together, and also bolted to the frame and yoke brace.

VALVE GEARING

is the shifting link motion. The links are forged of Low Moor iron and case-hardened, and are made either solid or skeleton. They are hung in the center vertically, and back of the center horizontally.

The suspension pin is forged on the saddle, and the latter is bolted to the link.

CONNECTING RODS

are made of best hammered iron. The body of the rod is tapered from the front to the back end. The corners are chamfered off, and the rod accurately planed, and finished all over. The front end has a strap and two brasses. The lost motion is taken up with a key placed vertically in the stub end, and secured by double nuts. The key bears against a wrought iron plate. The straps are held by two bolts.*

The back stub end has two brasses, which are held by a strap bolted to the rod with two bolts. The lost motion is taken up with a key, which is secured with lock nuts, and bears against a wrought iron plate.

COUPLING RODS

are made of best hammered iron, planed and finished all over, with the corners of the body of the rod chamfered off. Each of the crank pin journals has two brasses, held with straps bolted to the rods with two bolts. The lost motion is taken up with suitable keys, secured with lock nuts.

LIFTING SHAFTS

are made of wrought iron forged solid. The arms have wide taper bearings for the pins of suspension links. The vertical arm to which the reach rod is attached is curved so as to clear the boiler. The ends are supported by cast iron stands, bolted to the frame.

In the centre of the shaft is a short arm to which is attached a rod which passes through two volute springs, which serve as a counter-balance for the links.

REVERSE LEVER.

The fulcrum is at the frame. The quadrant is made in two parts, case-hardened, and notched to hold the lever in the desired position. The lever is connected with the lifting shaft by the reach rod, which is supported by a bracket, fastened to the running board.

ECCENTRICS

are cast with a boss on one side; they are bored and turned to special gauges. Each eccentric is fastened to the axle with two steel set screws, cupped on the end.

ECCENTRIC STRAPS

are cast iron. They are bored out with a recess to receive the eccentrics; all parts accurately made to standard gauges. The two parts are joined at an angle of forty-five degrees with the center of the eccentric rod. An oil cup is cast on the top of the back half, and an oil cellar on the bottom of the front half.

ECCENTRIC RODS

are bolted with three bolts to the straps, and have a jaw on the front end to take the links. A pin with a steel thimble, which turns in the link, is fitted into the jaw.

DRIVING-WHEELS.

The driving-wheel centers are made of cast iron, with hollow spokes and hollow rim. The section of the spokes is elliptical. The hubs for axles and crank pins are cast solid, and are flush with each other on the outside. The wheels are each keyed on the axles with a key, an inch square, and are placed with the right hand crank ahead. They are pressed on by a hydraulic press and the holes for the crank pins bored in a quartering machine. The outsides of the

*The rods which are used with cross-heads having two guides have solid ends in front, with two brasses, and a horizontal key.

All the brasses of the connecting rods are babitted, and each journal has one of Ricker's patent oilers.

wheels are turned, the hubs bored and faced to gauges for each.

TIRES

are made of steel of an approved manufacture, and are bored out and shrunk on the centers, and secured with 1¼ inch bolts. The bolts are tapped into the rim of the wheel, and their ends are turned down to ⅞ inch diameter, and are fitted into a hole drilled into the tire to receive it. The hole is drilled deeper than the length of the bolts, so that the latter do not bear on the bottom of the hole.

DRIVING AXLES

are made of hammered iron. The main axles are turned their whole length to receive the eccentrics, the others are left rough between the inside collars. The collars are made of cast iron, shrunk on the axles, and form an inside bearing for the driving-boxes. The axles are all finished to gauges for their diameter and length.

CRANK PINS

are made of steel, fitted into the wheel with a straight bearing, and pressed in by a hydraulic press. The diameters and length are all turned to standard gauges. The main pins have a collar between the bearings for main and parallel rods, and all the pins have collars on the outer end.

DRIVING BOXES

are made of cast iron, with brass bearings babbitted. The top of the brass is round, and is turned where it bears against the box. The seat for the brass in the box is first laid off from the template, and then slotted out to a gauge. The sides and faces of the box are all planed to gauges for the length of bearings and thickness of flanges. The oil cellars and recesses to receive them are also planed, and the cellars held in position with two ½ inch bolts, which pass through the flanges of the box.

COUNTER-BALANCE WEIGHTS

are made of cast iron, and are bolted in pairs between the spokes of the wheels. Each pair is held in position by three bolts, with countersunk heads on the outside, and nuts which are let into a recess cast in the weights on the inside.

WHEEL-COVERS.

All the wheels have sheet iron covers, arranged to prevent the wheels from throwing mud over the engine.

ENGINE TRUCKS.

The frames for four-wheeled trucks are forged in one piece, and are planed on the outside edges and where the pedestals are bolted on. All the holes are drilled from a template, and the frame planed to a gauge. The pedestal jaws are made of wrought iron; the faces, sides, and top and bottom are planed to gauges. They are bolted to the frame with two bolts at the top, and with one bolt to the brace at the bottom. The boxes are planed and bored to gauges in the same way as the driving-boxes. Each box has a babbitted brass bearing, and an oil cellar. The axles are made of hammered iron or steel. The wheels are double plate or spoke cast iron, and are pressed on the axles by hydraulic pressure.

The trucks have a center bearing, with Smith's swing motion. A cast iron center casting is bolted to the bottom of the cylinder casting, and rests on the truck center. A center pin passes through both.

The truck springs are made of cast steel, in the same way as the driving-springs. They are placed underneath the truck frame, and are hung between two curved equalizing beams, which rest on the top of the truck boxes. Check chains are attached to the engine and truck frames, at each end of the latter. Suitable sheet-iron covers are arranged, so as to prevent the truck wheels from throwing mud on the engine.

PUMPS

are made of brass or cast-iron, are full stroke, driven from the cross-heads. They have cage-cup valves, and top and bottom air-chambers. The top chamber is connected to the check by a copper injection pipe, fitted with coupling nuts. The bottom chamber is connected with the suction pipe by a stuffing-box. The suction pipes are brass and are furnished with adjustable feed cocks, under control of the engineer. Each pump is supplied with a pet cock, worked from the cab, and also with frost plugs.

CHECK-VALVES

are of brass, and are attached to the boiler with ball joints; they have the same valves as the pumps.

THROTTLE-VALVES

are double seat poppet valves, with the spindles standing vertical. They are placed in the top of the dome. The seat is cast on the upper end of the dry pipe. The valve and seat are both made of cast iron. The spindle of valve extends down below the bottom of the dome, and is worked by a bell crank attached to the dry pipe. The crank is attached by a rod to the throttle lever.

THROTTLE-LEVERS

are made of the most approved pattern, and located in a convenient position, usually at the back end of the furnace.

DRY PIPES

consist of a vertical cast-iron pipe in the dome, which is connected to the smoke-box by a wrought iron pipe. The latter has a brass neck riveted to it, and is fastened with a strap bolt to two lugs on the cast iron pipe. To the front end of the dry pipe a brass sleeve is riveted, which makes a steam-tight joint, with another brass casting riveted to the inside of the front tube sheet.

STEAM PIPES.

A cast iron T pipe is bolted to the tube sheet in the smoke-box, and joins the brass sleeve in the dry pipe with a ball joint. Two curved cast iron steam pipes connect the T pipe with the cylinders. The steam pipes are bolted at each end with two studs.

EXHAUST NOZZLES.

Double exhaust nozzles are bolted to the exhaust pipes. Three sizes are furnished with each engine, to be used to suit the condition under which the engine is worked.

PETTICOAT PIPES

are made with a flared mouth at the bottom. The pipe is made telescopic, the lower half sliding into the upper, and fastened to the latter with two bolts. The upper part is attached to the smoke box with three bolts, and the height is regulated with jam nuts on each of the bolts.

CYLINDER AND STEAM-CHEST CASTINGS.

The cylinder heads are covered with either a cast iron or brass casing. The body of the cylinders are lagged with wood, and sheathed with brass or Russia iron. The casings for the covers of the steam-chests are made of cast iron, and that for the sides of Russia iron or sheet brass.

CYLINDER COCKS.

The cylinders each have two cocks, so arranged that they can be opened from the cab.

OIL COCKS.

Two oil cocks are located inside the cab, and are connected to the steam-chest by solid brass pipes, so that the slide-valves can be oiled from the cab. The cocks are so arranged that steam can be admitted behind the oil to force it into the steam-chest, or the pipes be cleaned when necessary. At the point where the pipe joins the steam-chest, a valve is provided which is closed by the pressure of the steam in the chest.

CAB.

The cabs are made of ash, with walnut moldings, all of good quality and well seasoned. They are well framed, and bolted together with ½ inch joint bolts. Two pieces of sheet iron ⅛ inch thick, are bolted, one inside and one outside the cab, where it rests on the boiler. The rafters are curved, and the roof covered with tin. All the windows and doors are fastened with convenient and substantial fastenings. The inside and the outside of cab are varnished. Suitable handles, and cast-iron steps to get on and off the engine are attached to the engine in convenient positions. A gong for the bell-rope is attached to the under side of roof or ceiling.

RUNNING-BOARDS

are made of ash 2½ inches thick, supported on wrought-iron brackets bolted to the boiler. The outside edges of the running-boards are bound with brass.

DRAW CASTINGS.

A suitable casting to receive the coupling and pin is bolted to each end of the engines.

FOOT-BOARDS

are made of ¼ inch sheet iron, covered with oak planking.

GRATES, ASH PANS, SMOKE STACKS AND PILOTS

will be made on the most approved plan, and adapted to the fuel and service for which the engines are to be used.

SAND-BOXES

The top and bottom of the sand-boxes are made of cast iron, with ornamental moldings. The body is made of heavy sheet iron. Two iron pipes extend from the sand-box to within two inches of the rails forward of the front driving wheels. Suitable valves and a lever are attached to the cast iron base, to let the sand into the pipes.

The valves are worked by a rod attached to the lever, and extending to the cab.

BELLS AND STANDS.

The bells are hung by a cast iron yoke between two ornamental cast iron columns, fastened to a base which is bolted to the top of the boiler. The bell cord is attached to a brass arm fastened to the bell yoke.

HAND-RAILS

are made of brass pipes, supported by cast iron arms, which are screwed on to a stud tapped into the boiler.

LAMP BRACKETS.

Two cast iron brackets are bolted to the outside of the smoke box, and have a board, bound with brass, bolted to them to receive the head light.

NUMBER PLATES.

A circular cast iron plate with the number of the engine painted on it is put in the center of each smoke-box door.

FLAG-STANDS,

with ornamental brass bases are placed on each end of the front bumper timber.

MISCELLANEOUS.

A steam-gauge, whistle, two safety valves, gauge cocks, and two heater cocks are attached to each engine. Oil cans, jack-screws, pinch bars, wrenches, chains, tool boxes, extra bolts, and pokers are furnished with all engines.

GAUGES.

A complete system of standard gauges, male and female, is used for finishing all the work, so as to make it practically interchangeable. A special department is devoted to the manufacture and care of the gauges and tools.

BOLTS.

The heads and nuts of bolts are made of the same size, so that the same wrench will take either, and the size of finished heads and nuts are made the same as those which are rough. The system of threads used is the Franklin Institute U. S. Standard. The holes into which bolts are fitted are invariably reamed with reamers made and kept to the standard size.

TENDERS

have two four-wheeled trucks, either iron frames or wood.*

TANK

made of charcoal iron, riveted with ⅜ inch rivets, and strongly braced and securely fastened to the tender frame. The sides of the tank are made of No. 8, and the top and bottom of No. 6 iron. The sheets are secured together at the corners with angle iron. The legs of the tank are rounded at the front end, and taper back to the body of the tank. A suitable manhole is put on the top of the tank at the back end. The front end of each leg of the tank has a valve for letting the water into the feed-pipes, which are connected to the tank by rubber hose attached underneath the tender valves. A cock is put into the tank near the bottom, and furnished with a piece of rubber hose for wetting down the coal and foot-board.

* Four-wheeled switching engines sometimes have four-wheeled tenders.

TENDER FRAME

is made of three longitudinal, two end, two bolster, and one center transverse timber of well-seasoned oak. The outside timbers are framed and fastened together at the corners with strong castings. The bolsters are also attached to the outside timbers with castings, and the whole bolted together with 1 inch transverse rods, running through the frame from one side to the other. Cast iron brackets on the outside of the frames carry a timber on which the tank rests.

The flooring is 1½ inch thick, made of pine, and securely spiked down. A strong draw casting is attached to the frame at each end. The front end is coupled to the engine with a heavy bar. On each side of the bar are two heavy safety chains connecting the engine and tender together.

TENDER TRUCKS

each have four cast iron plate wheels. The axles have outside bearings. The front truck has a center, and the back truck side bearings. The frames are made of an approved plan, of the best material and workmanship, and have check chains on each corner of both trucks. The back trucks have brakes, with a wheel and shaft in a convenient position for setting the brakes.

PAINT.

The engine and tender each have one coat of priming, one of filling, and one of body color, and then ornamented, and finished with three coats of varnish.

The New Jersey Lease.

The following is from the *United States Railroad and Mining Register*, of the 13th, which has unusual facilities for information on this subject and is always careful in its statement:

On Wednesday there occurred the annual meetings, at Trenton, of the stockholders of the Delaware & Raritan Canal Company, and of the Camden and Amboy Railroad Company. These two originally distinct organizations have always been kept officially separate, although operated as one, and the stock all passing by the one title of Camden & Amboy stock, a canal certificate being good for a railroad purchase, but not carrying a right to a railroad vote, and *vice versa*. Two sets of books are kept and two sets of officers. The stock has gone up under the influence of the rumored lease from 115 to 125, and is expected to go to 135 if the lease be consummated. Those who oppose the lease, however, allege that the New Jersey roads have property that is constantly appreciating in value.

The result of the annual voting on Wednesday was in favor of leasing. The present directors in both companies were re-elected, by majorities of between 10,000 and 20,000. Of the seven directors of the railroad, Wm. H. Gatzmer, Benj. Fish, Cambridge Livingston, Ashbel Welch, Samuel Welsh, Charles Macalester and Wm. G. Cook, five are against leasing. Of the nine directors of the canal, Robert F. Stockton, J. M. Read, Moses Taylor, J. G. Stevens, R. S. Conover, W. W. Shippen, A. W. Markley, J. J. Astor and G. M. Dorrance, seven are in favor of leasing.

The Reading Railroad has appeared in the field as an offerer, but, as Mr. Gowen is represented to state, only in case the Pennsylvania negotiations fail. The Reading proposal is reported as follows: The Reading Railroad Company offers $750,000 per annum for a perpetual lease of the Delaware & Raritan *Canal;* or, a bonus of $1,000,000 and 10 per cent. annually on $35,245,000, (the actual cost) for *all the property* of the United Companies. Mr. A. Welch informed the stockholders that the lease when fully arranged with the Pennsylvania Railroad would be regularly submitted to them for acceptance or rejection. Mr. Hulme moved that the fact of a determination to lease should be published as widely as possible to invite competitors. His motion was referred to the board. A second resolution by Mr. Hulme was adopted, that the terms of the lease when fixed shall be published for twenty days in advance of the special meeting of the stockholders to consider the same. A third resolution declaring the present organization of the companies too cumbersome and expensive, was referred to the board.

—A piece of railroad track in Ararat Township, Pa., has been causing the company much anxiety and expense by sinking and disappearing altogether. A Pennsylvania paper says: "It has been found that under the swamp is a subterranean pond, of several acres in extent, and of considerable depth. This pond is covered by about six feet in depth of black earth, which supports a heavy growth of woods. The trees are mostly soft maple, pine, hemlock, and birch, many of them ranging from six inches to three feet in diameter. Last fall it was discovered that the subterranean pond contains many fish, of the kind usually found in ponds in this part of the county—pickerel and 'shiners' among others—but all without eyes! In the darkness of their subterranean abode they have no use for the organ of vision. The Ball Pond, about a mile and a half distant, is now 'growing over.' A considerable part of it has become subterranean within the last twenty years, and probably before many years it will be entirely covered, like the other. This pond is about twenty acres in extent. For some distance from the shore it is filled with a dense growth of water-lilies, and these, no doubt, furnish the foundation on which the superstructure of earth is commenced."

Columbus, Springfield & Cincinnati.

This road, completed from Springfield, Ohio, west 20 miles to London, and operated by the Cincinnati, Sandusky & Cleveland Company, is in process of construction between London and Columbus, and the contractors expect to complete it by the 1st of September next.